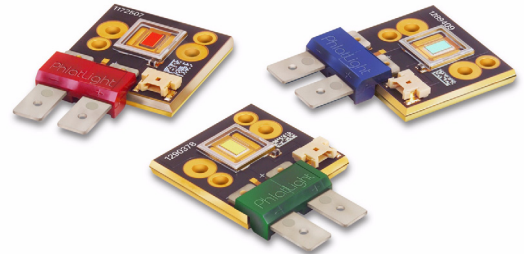


## PhlatLight™ PT120 Projection Chipset



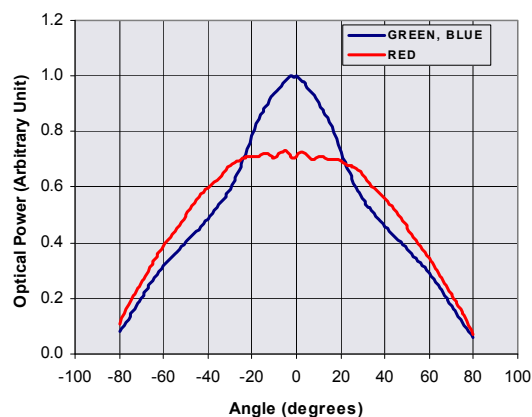
### Technology Overview

Luminus Devices' Projection Technology is an innovative solid-state light source created to replace arc lamps in projection systems. Enabled by unique use of Photonic Lattice technology, PhlatLight chipsets represent a major breakthrough in brightness that delivers all the benefits of solid state light sources in projections applications:

- Wide color gamut for vivid colors, exceeds NTSC.
- Instant turn-on, no more wait time.
- High Reliability; no lamp replacement
- Environmentally friendly technology - Mercury-free.
- Electronic control of color points and light intensity on a frame by frame basis

PhlatLight products benefit from numerous innovations in the domain of packaging, thermal management and optical coupling that allow designers to achieve efficient light engine designs and deliver high screen brightness.

### Angular Intensity Distribution- Example



### Features

- Matched RGB Chipset with 12mm<sup>2</sup> emitting area designed for projection applications
- Photonic lattice technology for very high surface brightness
- 100% surface emission for high collection efficiency and low optical losses
- Wide color gamut: RED 623 nm, GREEN 525 nm, BLUE 462 nm, EP Blue 460nm typical dominant wavelength
- Single emitting area per color allows for collection with single lens for simplified optics
- 16:9 aspect ratio matched with micro-display and screen aspect ratio
- Thermally efficient Type CX Common Anode package
- RoHS (lead-free) compliant

### Applications

- Specifically engineered for Rear-Projection Displays, front projectors, head-up projection displays
- Optimized for Micro-Display diagonal sizes ranging from 0.65" to 0.95" with 16:9 aspect ratio.
- Suitable for DLP™ (e.g. xHD5, 0.65", 0.95" 1080p), LCoS, HTPS and 3LCD microdisplays

## Optical and Electrical Characteristics

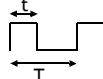
|   | Symbol                | Red     | Green   | Blue    | EP-Blue <sup>1</sup><br>Preliminary | Unit            |
|---|-----------------------|---------|---------|---------|-------------------------------------|-----------------|
| Bin Kit   |                       | MPB     | MPB     | MPB     | EPA                                 |                 |
| Emitting Area   |                       | 11.96   | 11.96   | 11.96   | 11.96                               | mm <sup>2</sup> |
| Emitting Area Dimensions  |                       | 4.6x2.6 | 4.6x2.6 | 4.6x2.6 | 4.6x2.6                             | mmxmm           |
| Characteristics at recommended Pulsed Drive Current $I_F^{2,3}$ |                       |         |         |         |                                     |                 |
| Reference Duty Cycle <sup>4</sup>                               |                       | 25      | 50      | 25      | 25                                  | %               |
| Recommended Peak Drive Current <sup>5</sup>                     | typ $I_F$             | 30      | 30      | 30      | 30                                  | A               |
| Peak Luminous Flux <sup>6</sup>                                 | typ $\Phi_V$          | 1800    | 3500    | 600     | 750                                 | lm              |
| Peak Radiometric Power  | typ $\Phi_r$          | 10.4    | 7.3     | 12.1    | 16.3                                | W               |
| Dominant Wavelength   | $\lambda_{dmin}$      | 619     | 516     | 455     | 450                                 | nm              |
|   | typ $\lambda_d$       | 623     | 525     | 462     | 460                                 | nm              |
|   | $\lambda_{dmax}$      | 630     | 535     | 469     | 468                                 | nm              |
| FWHM - Spectral bandwidth at 50% of $\Phi_V$                    | typ $\Delta\lambda_d$ | 19      | 39      | 20      | 20                                  | nm              |
| Color Saturation <sup>7,8</sup>                                 | typ                   | 1.00    | 0.79    | 0.99    | 0.99                                |                 |
| Chromaticity Coordinates <sup>7,8</sup>                         | typ x                 | 0.697   | 0.171   | 0.144   | 0.154                               |                 |
|   | typ y                 | 0.303   | 0.702   | 0.040   | 0.024                               |                 |
| Forward Voltage   | min $V_{Fmin}$        | 2.2     | 3.5     | 3.5     | 3.2                                 | V               |
|   | typ $V_F$             | 2.6     | 4.9     | 4.9     | 4.0                                 | V               |
|   | max $V_{Fmax}$        | 3.4     | 5.9     | 5.9     | 5.2                                 | V               |
| Dynamic Resistance  | typ $\Omega_{dyn}$    | 0.02    | 0.03    | 0.02    | 0.02                                | $\Omega$        |
| Device Thermal Characteristics and Lifetime                     |                       |         |         |         |                                     |                 |
| Thermal Coefficient of Photometric Flux                         | typ                   | -1.1    | -0.2    | -0      | -0                                  | % / °C          |
| Thermal Coefficient of Radiometric Flux                         | typ                   | -0.7    | -0.2    | -0.2    | -0.2                                | % / °C          |
| Forward Voltage Temperature Coefficient                         | typ                   | -3.0    | -3.0    | -3.0    | -3.0                                | mV / °C         |
| Median Lifetime <sup>9</sup>                                    |                       | >60,000 | >60,000 | >60,000 | >60,000                             | Hours           |

## Optical and Electrical Characteristics

|  |     | Symbol            | Red   | Green | Blue  | EP-Blue <sup>1</sup><br>Preliminary | Unit     |
|--|-----|-------------------|-------|-------|-------|-------------------------------------|----------|
| Characteristics at Reference Continuous Drive Current $I_F$ (Continuous Waveform) <sup>2</sup> |     |                   |       |       |       |                                     |          |
| Reference Drive Current  | typ | $I_F$             | 18    | 18    | 18    | 18                                  | A        |
| Luminous Flux  | typ | $\Phi_v$          | 1010  | 2450  | 435   | 540                                 | lm       |
| Radiometric Flux   | typ | $\Phi_r$          | 5.8   | 4.7   | 8.0   | 10.8                                | W        |
| Dominant Wavelength  | typ | $\lambda_d$       | 624   | 528   | 464   | 462                                 | nm       |
| Color Saturation <sup>7,8</sup>  | typ |                   | 1.00  | 0.83  | 0.99  | 0.99                                |          |
| FWHM - Spectral bandwidth at 50% of $\Phi_v$   | typ | $\Delta\lambda_d$ | 18    | 38    | 21    | 21                                  | nm       |
| Chromaticity Coordinates <sup>7,8</sup>  | typ | x                 | 0.698 | 0.183 | 0.141 | 0.153                               |          |
|  | typ | y                 | 0.301 | 0.703 | 0.044 | 0.025                               |          |
| Forward Voltage  | min | $V_{Fmin}$        | 2.0   | 3.1   | 3.1   | 2.8                                 | V        |
|  | typ | $V_F$             | 2.3   | 4.4   | 4.4   | 3.6                                 | V        |
|  | max | $V_{Fmax}$        | 3.0   | 5.3   | 5.3   | 4.6                                 | V        |
| Dynamic Resistance   | typ | $\Omega_{dyn}$    | 0.02  | 0.03  | 0.02  | 0.05                                | $\Omega$ |

Note 1: EP-Blue is recommended for new designs. Please see page 9 for part ordering numbers.

Note 2: All ratings are based on operation with a constant heat sink temperature  $T_{hs} = 40^\circ\text{C}$ . See Thermal Resistance section for  $T_{hs}$  definition.

Note 3: Parameters rated at typical duty cycle and Pulsed operation frequency  $f > 240\text{Hz}$ ;  $DC = \frac{t}{T}$  

Note 4: Duty Cycle used to specify device ratings under Pulsed operation. PhlatLight devices can operate at duty cycles ranging from 1% to 100%. At higher duty cycles, drive current should be adjusted to maintain the junction temperature at desired levels to meet the application lifetime requirements.

Note 5: In pulsed operation, rise time from 10 to 90% of forward current should be larger than 0.5 microseconds.

Note 6: For Blue and EP-Blue devices, total flux from emitting area at typical dominant wavelength at recommended peak drive current conditions.

Note 7: In CIE 1931 chromaticity diagram coordinates, normalized to  $X+Y+Z=1$

Note 8: For Reference only

Note 9: Assuming  $T_j < 80^\circ\text{C}$  for Red devices and  $T_j < 115^\circ\text{C}$  for Blue devices and  $T_j < 125^\circ\text{C}$  for Green devices

## Absolute Maximum Ratings

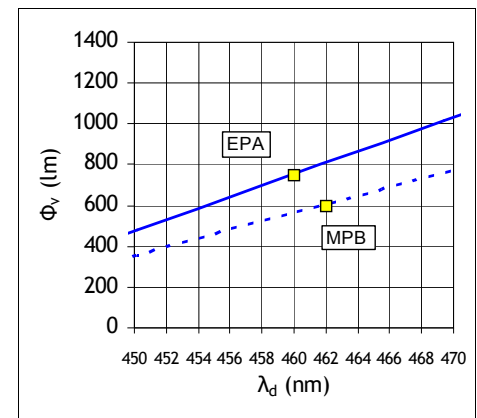
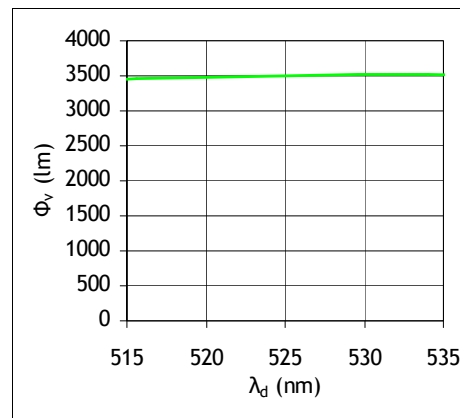
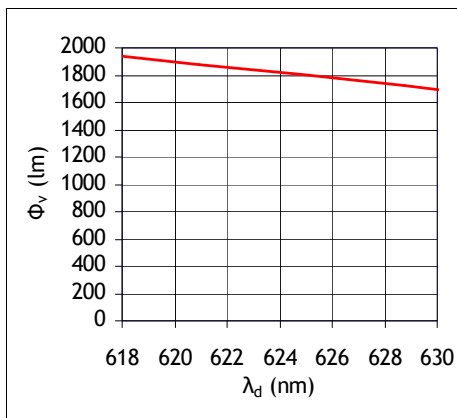
|   |     | Symbol     | Red      | Green    | Blue     | EP-Blue  | Unit |
|---|-----|------------|----------|----------|----------|----------|------|
| Maximum Current <sup>1,2</sup>                      | Max |            | 36       | 36       | 36       | 36       | A    |
| Maximum Operating Junction Temperature <sup>3</sup> | Max | $T_{jmax}$ | 110      | 170      | 170      | 170      | °C   |
| Storage Temperature Range                           |     |            | -40/+100 | -40/+100 | -40/+100 | -40/+100 | °C   |

**Note 1:** Luminus PhlatLight LEDs are designed for operation to an absolute maximum forward drive current density of 2.5A/mm<sup>2</sup> cw, and 3A/mm<sup>2</sup> pulsed ( $f > 240\text{Hz}$ , duty cycle < 60%). Please refer to absolute maximum rating table above for specific absolute maximum currents for the products covered in this datasheet. Product lifetime data is specified at recommended forward drive currents. Sustained operation at absolute maximum currents will result in a reduction of device lifetime compared to recommended forward drive currents. Actual device lifetimes will also depend on junction temperature. Refer to the lifetime derating curves (available from Luminus) for further information.

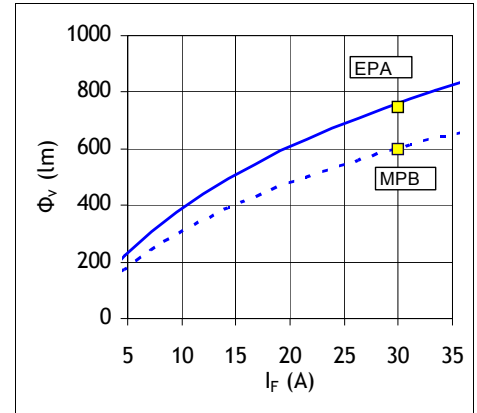
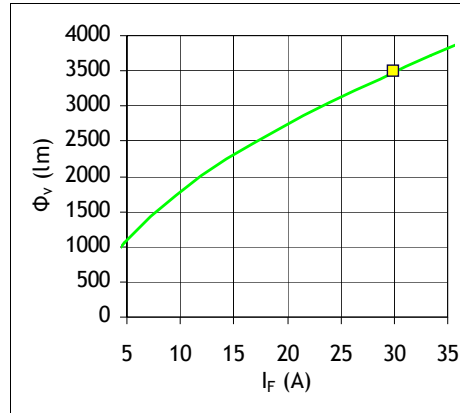
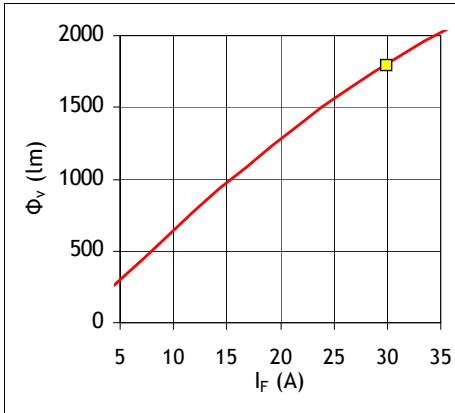
**Note 2:** In pulsed operation, rise time from 10 to 90% of forward current should be larger than 0.5 microseconds.

**Note 3:** Sustained operation at Maximum Operating Junction Temperature ( $T_{jmax}$ ) will result in reduced device life time.

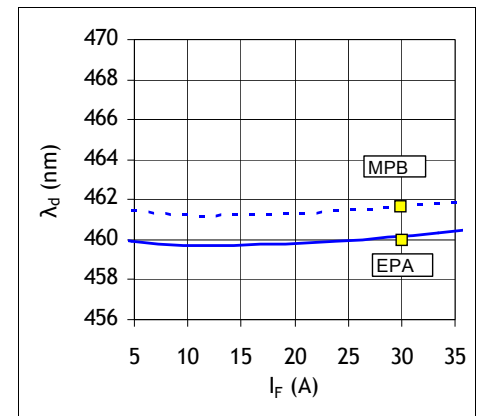
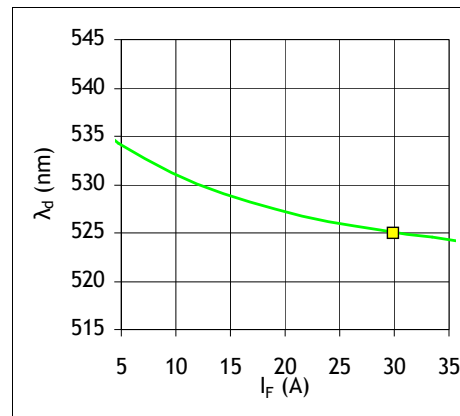
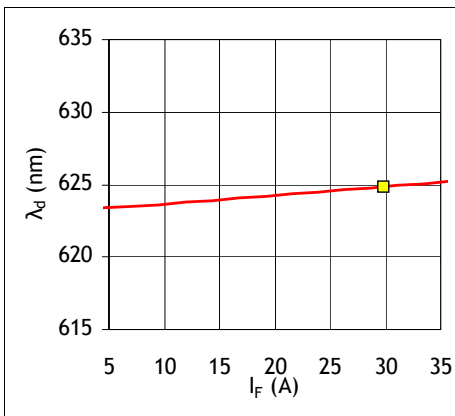
## Luminous Flux variation with Wavelength: $\Phi_v = f(\lambda_d)$ at Recommended Operating Current $I_F$



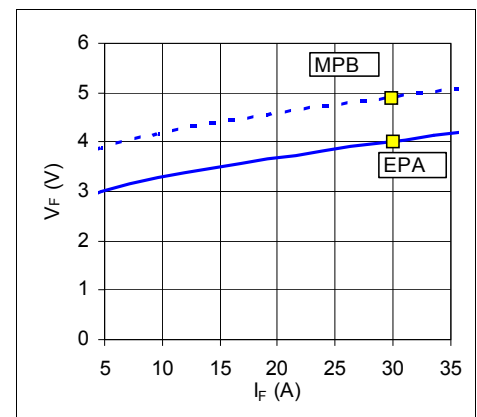
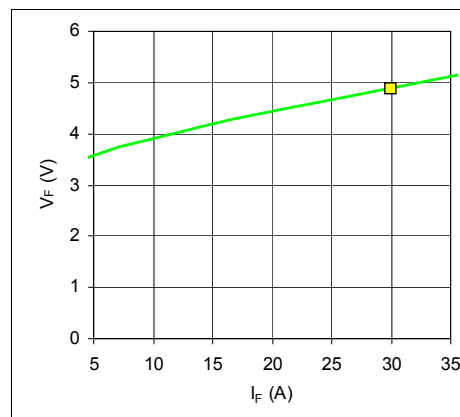
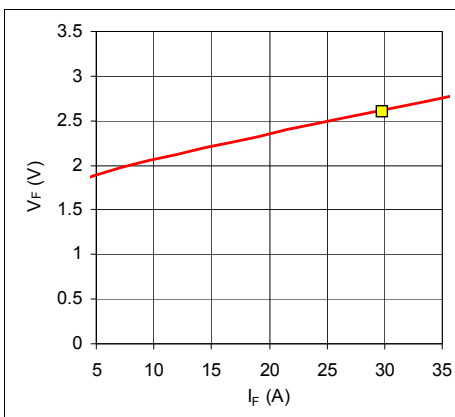
See note 1 on page 6.

Luminous Flux variation with Drive Current -  $\Phi_v = f(I_F)$  - Typical

See notes 1,2 on page 6.

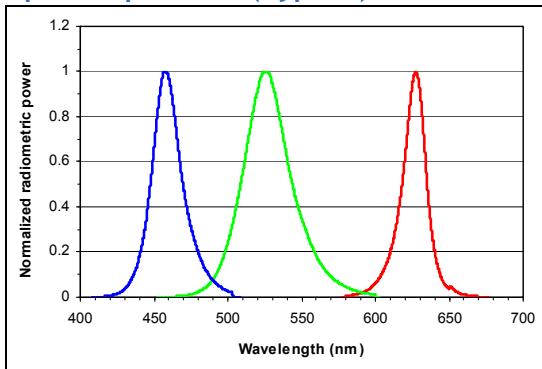
Dominant Wavelength variation with Forward Current -  $\lambda_d = f(I_F)$  - Typical

See notes 1,2 on page 6.

Forward Voltage variation with Drive current -  $V_F = f(I_F)$  - Typical

See notes 1,2 on page 6.

### Optical Spectrum (Typical)

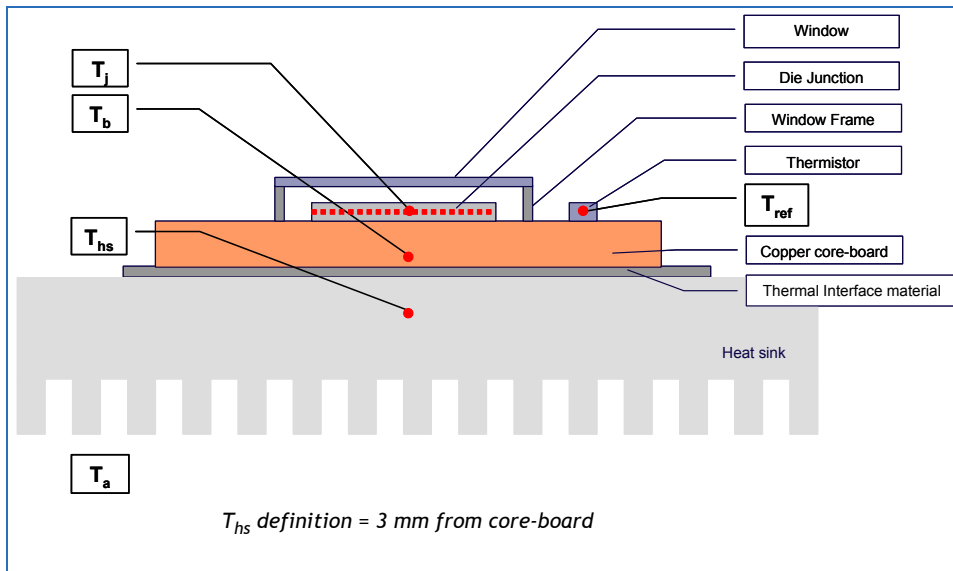


See note 3 on page 6.

### Chart Notes

- Note 1:** For Pulsed operation, typical RGB duty cycles used are 25%, 50% and 25% respectively for pulsed operation ( $T_{hs} = 40^{\circ}\text{C}$ ).
- Note 2:** Yellow square indicate device operating point under recommended conditions listed in the Optical and Electrical Characteristics table.
- Note 3:** Typical Spectrum at recommended peak drive current.

## Thermal Resistance



### Typical Thermal Resistance

|                         |          |
|-------------------------|----------|
| $R_{\theta j-b}^1$      | 0.6 °C/W |
| $R_{\theta b-hs}^2$     | 0.1 °C/W |
| $R_{\theta j-hs}^{1,2}$ | 0.7 °C/W |
| $R_{\theta j-ref}^1$    | 0.6 °C/W |

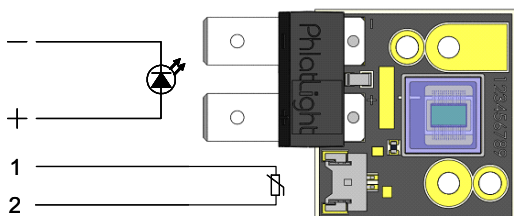
**Note 1:** Thermal resistance values are based on finite element analysis model results correlated to measured  $R_{\theta j-hs}$  data

**Note 2:** Thermal Resistance is based on eGraph 1205 Thermal interface.

## Thermistor Information

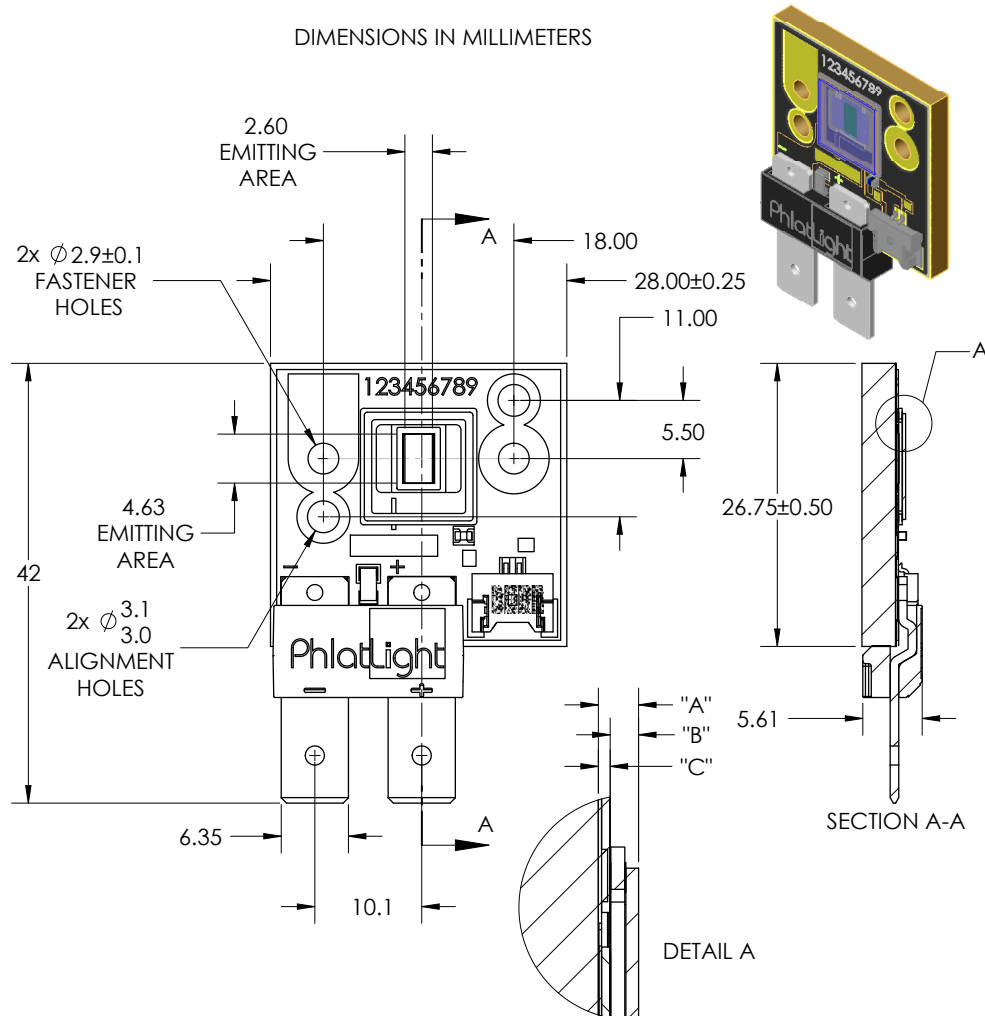
The thermistor used in PhlatLight™ devices mounted on core-boards is from Murata Manufacturing Co. The global part number is NCP15XH103J03RC. Please see <http://www.murata.com/> or <http://www.murata.co.jp> for details on calculating thermistor temperature.

## Electrical Pinout



## Mechanical Dimensions

Package: Type CX



| DIMENSION NAME | DESCRIPTION                             | NOMINAL DIMENSION | TOLERANCE |
|----------------|---|-------------------|-----------|
| "A"            | TOP OF METAL SUBSTRATE TO TOP OF GLASS  | 0.95              | ±0.13     |
| "B"            | EMITTING AREA TO TOP OF GLASS           | 0.67              | ±0.16     |
| "C"            | TOP OF METAL SUBSTRATE TO EMITTING AREA | 0.28              | ±0.05     |

Recommended connector for Anode and Cathode: Panduit Disco Lok™ Series P/N: DNG14-250FL-C or equivalent  
 Thermistor Connector: MOLEX P/N 53780-0270. Recommended Female: MOLEX P/N 51146-0200 or equivalent  
 For detailed drawing of the PT120 Type CX package, please refer to the DWG-001124 document



## Ordering Information

| Device Part Number            | Color   | Description  |
|-------------------------------|---------|--|
| PT-120-R-C11-MPB              | Red     | Bin Kit MPB Red PhlatLight PT120 device consisting of a 12mm <sup>2</sup> LED, thermistor and connector mounted on a type CX copper-core PCB   |
| PT-120-G-C11-MPB              | Green   | Bin Kit MPB Green PhlatLight PT120 device consisting of a 12mm <sup>2</sup> LED, thermistor and connector mounted on a type CX copper-core PCB |
| PT-120-B-C11-MPB <sup>1</sup> | Blue    | Bin Kit MPB Blue PhlatLight PT120 device consisting of a 12mm <sup>2</sup> LED, thermistor and connector mounted on a type CX copper-core PCB  |
| PT-120-B-C11-EPA <sup>2</sup> | EP-Blue | Bin Kit EPA Blue PhlatLight PT120 device consisting of a 12mm <sup>2</sup> LED, thermistor and connector mounted on a type CX copper-core PCB  |

Note 1: Not recommended for new designs

Note 2: Bin Kit EPA Blue is recommended for new designs.

[www.luminus.com](http://www.luminus.com)

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