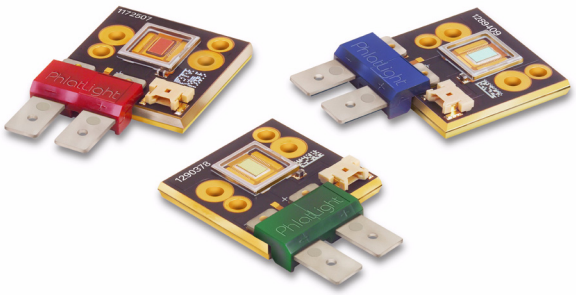
PRODUCT DATA SHEET

PhlatLight™ PT85 Projection Chipset

Preliminary



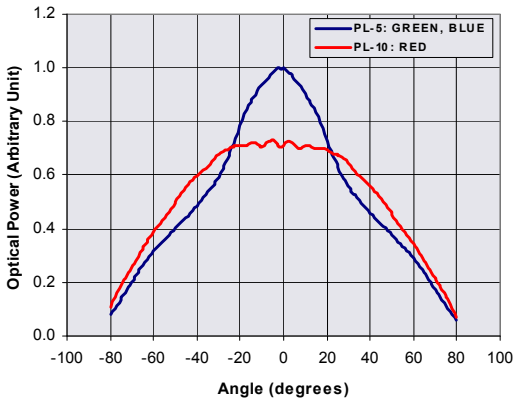
Technology Overview

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.
- Lifetime of light source at par with TV's - no more bulb 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 8.56 mm^2 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 526 nm, BLUE 462 nm 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
- Over 2150 emitted white lumens at 8000K color temperature from single chipset under Continuous Wave Operation.
- Over 1500 emitted white lumens at 8000K color temperature from single chipset under Pulsed Operation.
- Uniform surface emission
- Thermally efficient Type CX Common Anode packaging
- RoHS (lead-free) compliant

Applications

- Specifically engineered for Rear-Projection TVs, front projectors, head-up projection displays
- Optimized for Micro-Display diagonal sizes ranging from 0.55" to 0.78" with 16:9 aspect ratio.
- Suitable for DLP™, LCoS and HTPS microdisplays

Optical and Electrical Characteristics

		Symbol	Red	Green	Blue	Unit
Emitting Area			8.56	8.56	8.56	mm^2
Emitting Area Dimensions			3.9 x 2.19	3.9 x 2.19	3.9 x 2.19	mmxmm
Characteristics at recommended Continuous Drive Current I_F (Continuous Waveform)[1]						
Recommended Drive Current[2]	typ	I_F	12.8	12.8	12.8	A
Luminous Flux[3]	typ	Φ_v	715	1750	310	lm
Radiometric Flux[3]	typ	Φ_r	4.1	3.4	5.6	W
Dominant Wavelength[4]	typ	λ_d	624	528	462	nm
Color Saturation[5,6]	typ		1.00	0.83	0.99	
FWHM - Spectral bandwidth at 50% of Φ_v	typ	$\Delta\lambda_d$	18	38	25	nm
Chromaticity Coordinates[5,6]	typ	x	0.698	0.194	0.141	
	typ	y	0.302	0.706	0.046	
Forward Voltage	min	V_{Fmin}	2.0	3.2	2.7	V
	typ	V_F	2.3	4.4	4.0	V
	max	V_{Fmax}	3.0	5.3	4.8	V
Dynamic Resistance	typ	Ω_{dyn}	0.04	0.05	0.03	Ω
Characteristics at recommended Pulsed Drive Current I_F[1,7]						
Reference Duty Cycle[8]			25	50	25	%
Recommended Peak Drive Current[2]	typ	I_F	21.4	21.4	21.4	A
Peak Luminous Flux[3]	typ	Φ_v	1275	2500	425	lm
Peak Radiometric Flux[3]	typ	Φ_r	7.4	5.1	8.5	W
Dominant Wavelength[4]	typ	λ_d	623	525	462	nm
FWHM - Spectral bandwidth at 50% of Φ_v	typ	$\Delta\lambda_d$	19	40	26	nm
Color Saturation[5,6]	typ		1.00	0.80	0.99	
Chromaticity Coordinates[5,6]	typ	x	0.697	0.183	0.144	
	typ	y	0.303	0.702	0.040	
Forward Voltage	min	V_{Fmin}	2.2	3.5	3.1	V
	typ	V_F	2.6	4.9	4.5	V
	max	V_{Fmax}	3.4	5.9	5.5	V
Dynamic Resistance	typ	Ω_{dyn}	0.04	0.05	0.03	Ω

Optical and Electrical Characteristics

		Symbol	Red	Green	Blue	Unit
Common Characteristics CW/Pulsed						
Thermal Coefficient of Photometric Flux	typ		-0.69	-0.18	-0.007	% / °C
Thermal Coefficient of Radiometric Flux	typ		-0.52	-0.20	-0.17	% / °C
Forward Voltage Temperature Coefficient	typ		-1.3	-4.6	-3.5	mV / °C
Median Lifetime[9]			>60,000	>60,000	>60,000	Hours

Note 1: All ratings are based on operation with a constant heat sink temperature T_{hs} = 40°C. See Thermal Resistance section for T_{hs} definition.

Note 2: Luminus PhlatLight LEDs are designed for operation to an absolute maximum forward drive current density of 2.5A/mm^2 cw, and 3A/mm^2 pulsed (f>240Hz, duty cycle < 60%). Please refer to absolute maximum rating table below 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.

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

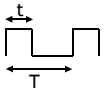
Note 3: Total flux from emitting area at typical dominant wavelength

Note 4: Minimum and Maximum Dominant Wavelengths are based on typical values +7/-3 nm for Red, +/- 9 nm for Green and +/-7 nm for Blue

Note 5: In CIE 1931 chromaticity diagram coordinates, normalized to X+Y+Z=1

Note 6: For Reference only

Note 7: Parameters rated at typical duty cycle and Pulsed operation frequency f>240Hz; $DC = \frac{t}{T}$



Note 8: 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 9: Assuming Tj<80°C for Red devices and Tj<120°C for Green and Blue devices

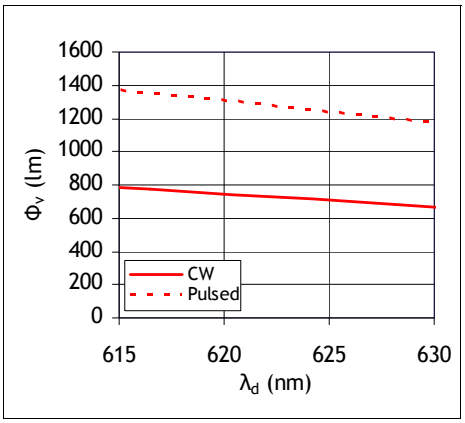
Absolute Maximum Ratings

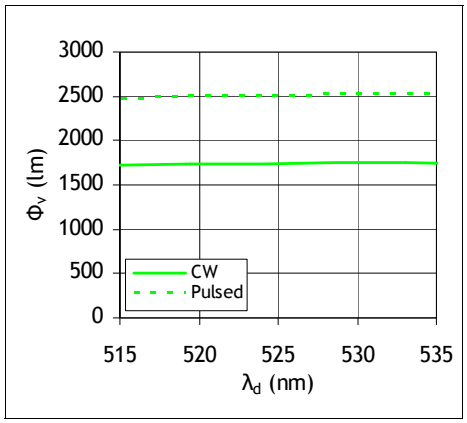
		Symbol	Red	Green	Blue	Unit
Maximum Current[1]	Max		25	25	25	A
Maximum Operating Junction Temperature	Max	T_{jopmax}	80	130	120	°C
Maximum Transient Junction Temperature[2]	Max	T_{jmax}	125	150	150	°C
Storage Temperature Range			-40/+100	-40/+100	-40/+100	°C

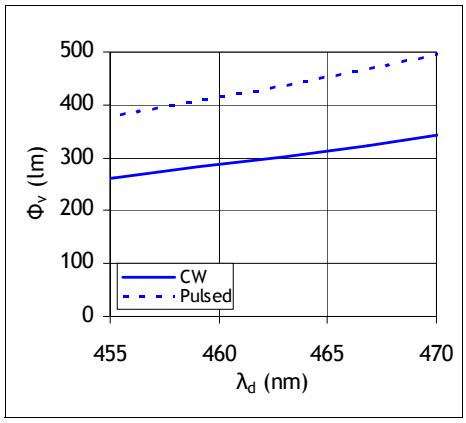
Note 1: See Note 2, above.

Note 2: Sustained operation at T_{jmax} may result in reduced device life time.

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

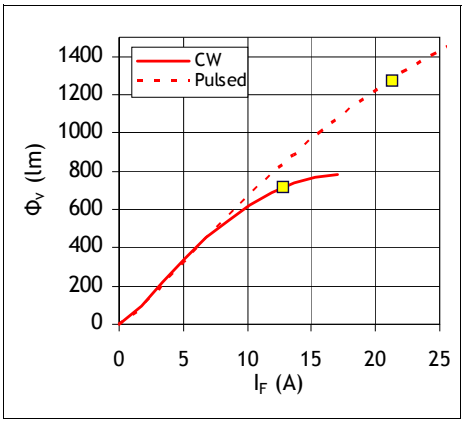


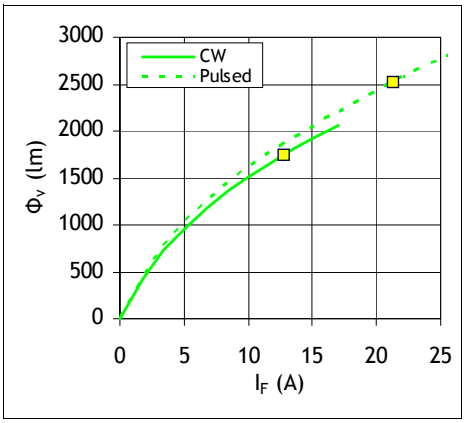


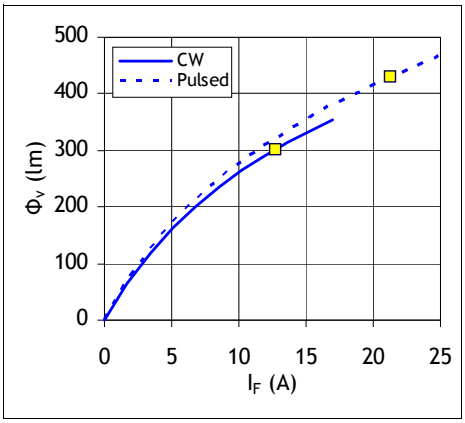


See note 1 on page 5.

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

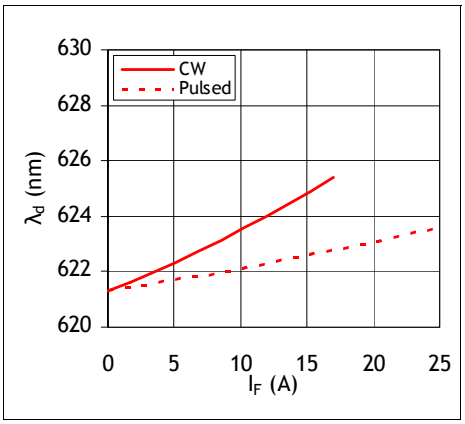


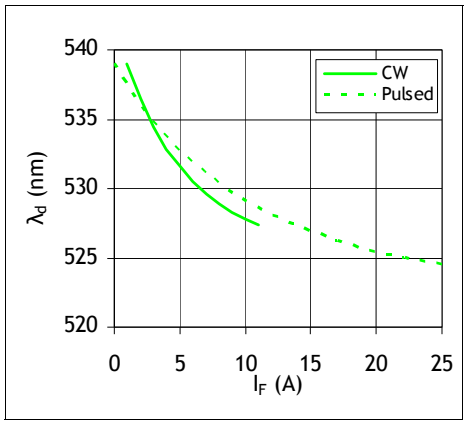


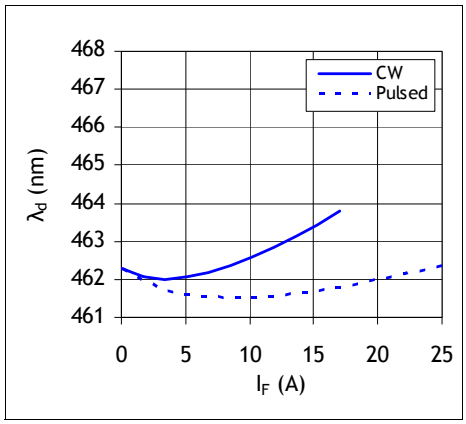


See notes 1,2 on page 5.

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

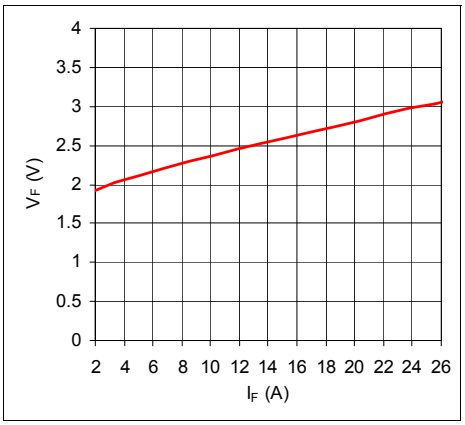


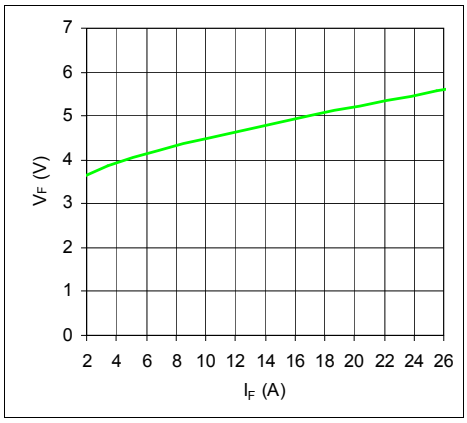


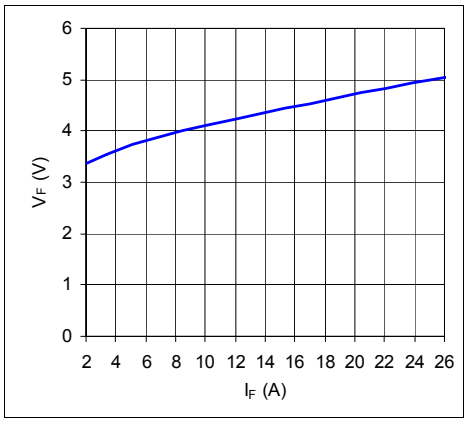


See notes 1,2 on page 5.

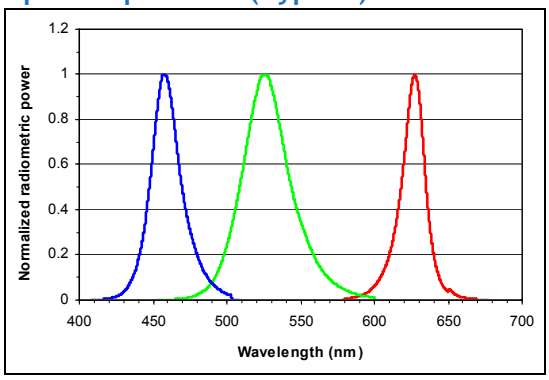
Forward Voltage variation with Drive current - $V_F = f(I_F)$ - Typical







Optical Spectrum (Typical)



See note 3 on page 5.

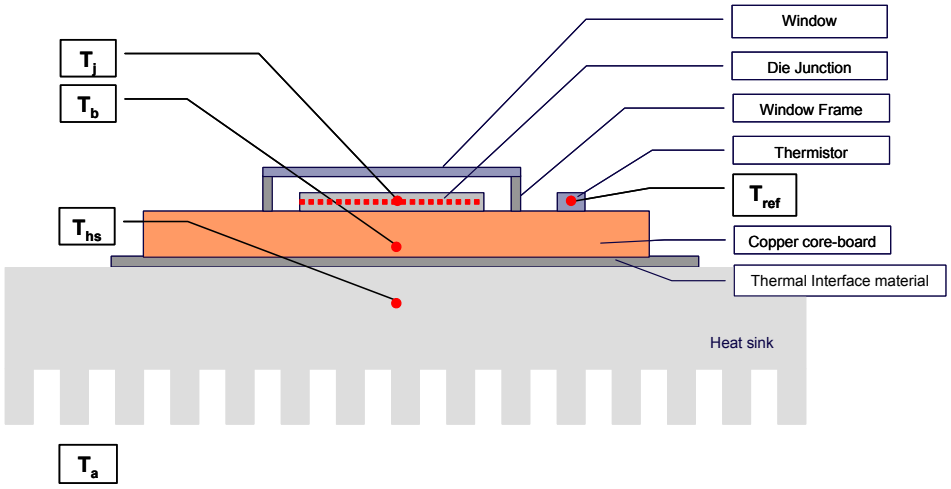
Chart Notes

Note 1: *For Pulsed operation, typical RGB duty cycles used are 25%, 50% and 25% respectively for pulsed operation (T_{hs}=40°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



T_{hs} definition = 3 mm from core-board

Typical Thermal Resistance

$R_{\theta j\text{-}b}$ [1]	0.77 °C/W
$R_{\theta b\text{-}hs}$ [2]	0.12 °C/W
$R_{\theta j\text{-}hs}$ [1,2]	0.89 °C/W
$R_{\theta j\text{-}ref}$ [1]	0.8 °C/W

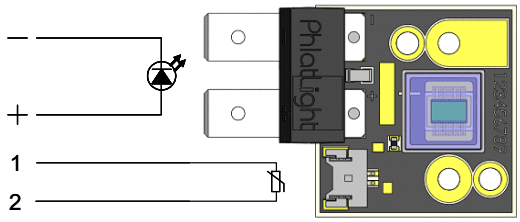
Note 1: Thermal resistance values are based on finite element analysis model results correlated to measured Rθj-hs data

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

Thermistor Information

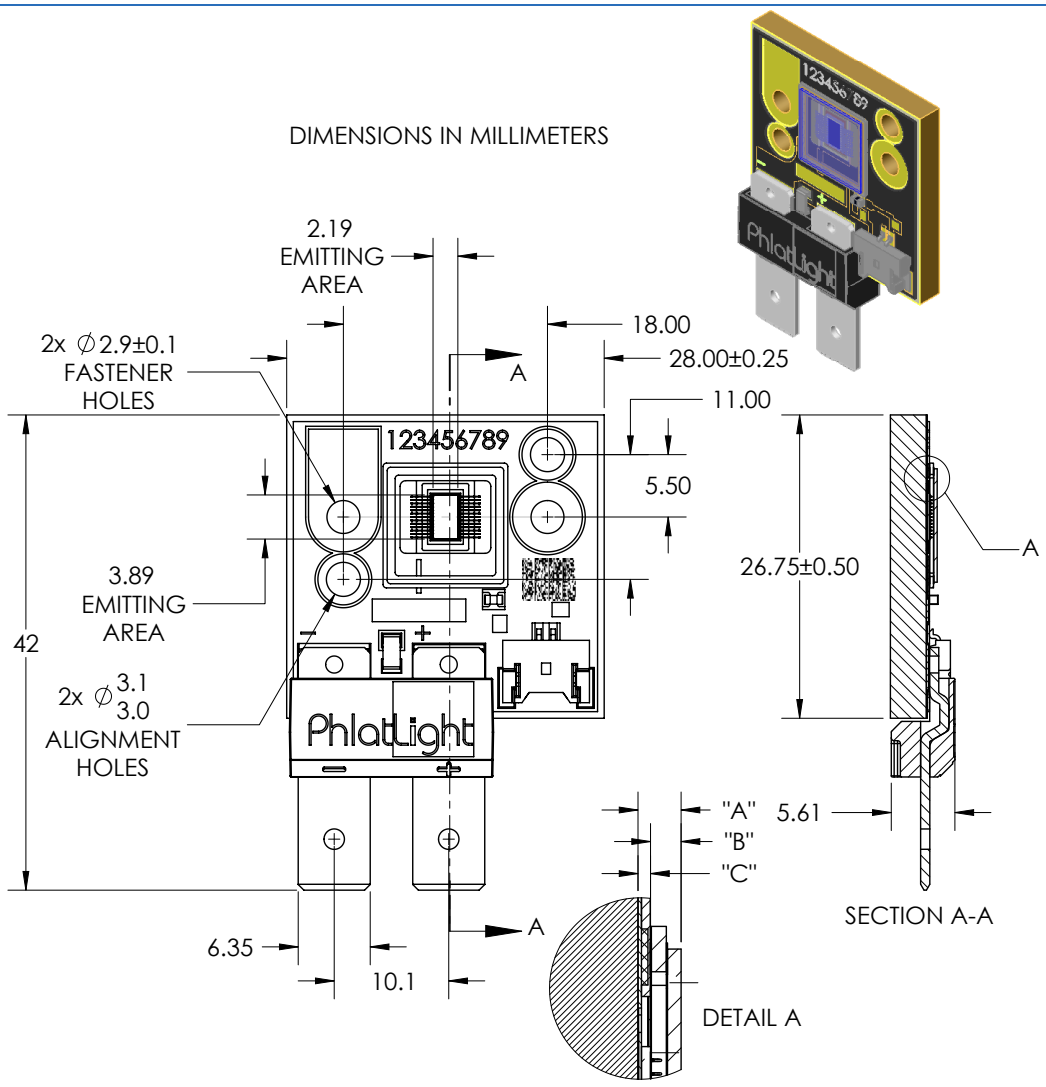
The thermistor used in PhlatLight™ devices mounted on core-boards is from Murata Manufacturing Co. The global part number is NCP15XH103J03RC. Please see http://www.murata.com/ or http://www.murata.co.jp for details on calculating thermistor temperature.

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
Thermistor Connector: MOLEX P/N 53780-0270. Recommended Female: MOLEX P/N 51146-0200 or equivalent
For detailed drawing of Type CX package, please refer to DWG-001057 document

Ordering Information

Device Part Number	Color	Description
PT-85-R-C11-KITSAMPLE	**Red**	Red PhlatLight PT85 consisting of a 8.5mm^2 LED, thermistor, connector, mounted on a type CX copper-core PCB
PT-85-G-C11-KITSAMPLE	**Green**	Green PhlatLight PT85 consisting of a 8.5mm^2 LED, thermistor, connector, mounted on a type CX copper-core PCB
PT-85-B-C11-KITSAMPLE	**Blue**	Blue PhlatLight PT85 consisting of a 8.5mm^2 LED, thermistor, connector, mounted on a type CX copper-core PCB

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