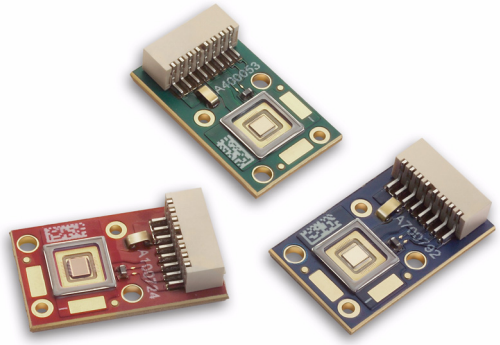
SUMMARY DATA SHEET

PhlatLight® PT39 Projection Chipset



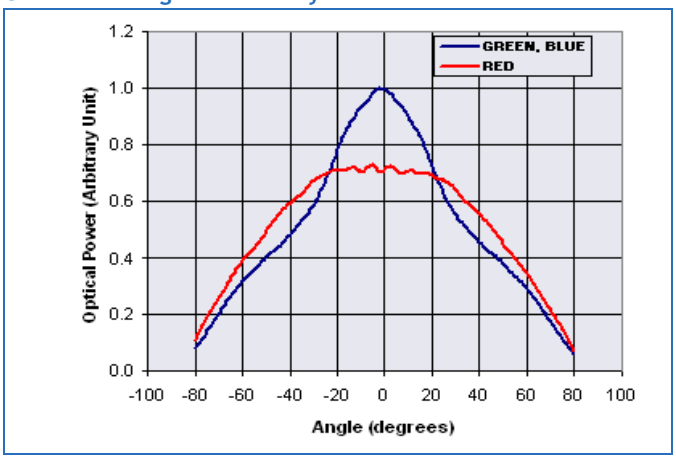
Technology Overview

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.

Collimated Angular Intensity Distribution



Features

- Matched RGB Chipset with 3.9mm^2 emitting area designed for small projector 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 and EP Blue 460 nm typical dominant wavelength
- Single emitting area per color allows for collection with single lens for simplified optics
- Aspect ratio compatible with 4:3 micro-displays
- Over 1120 emitted white lumens at 8000K color temperature from single chipset under Continuous Wave Operation
- Over 725 emitted white lumens at 8000K color temperature from single chipset under Pulsed (time-sequential)Operation
- Uniform surface emission
- Thermally efficient Type CX (lowest thermal resistance, Common Anode)
- RoHS (lead-free) compliant

Applications

- Specifically engineered for pocket-size, ultra portable front projectors, head-up projection displays
- Optimized for Micro-Display diagonal sizes ranging from 0.4" to 0.55" with 4:3 aspect ratio.
- Suitable for DLP™ (0.45" and 0.55" SVGA), LCoS and HTPS/ 3LCD microdisplays

Updated 3/1/10 PDS-001024 Rev 08

Optical and Electrical Characteristics

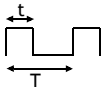
		Symbol	Red	Green	Blue	EP-Blue[1] Preliminary	Unit
Bin Kit			MPB	MPB	MPB	EPA	
Emitting Area			3.9	3.9	3.9	3.9	mm^2
Emitting Area Dimensions			2.09x1.87	2.09x1.87	2.09x1.87	2.09x1.87	mmxmm
Characteristics at recommended Pulsed Drive Current I_F[2,3]							
Reference Duty Cycle[4]			25	50	25	25	%
Recommended Peak Drive Current[5]	typ	I_F	9.8	9.8	9.8	9.8	A
Peak Luminous Flux[6]	typ	Φ_v	540	1100	190	215	lm
Peak Radiometric Power	typ	Φ_r	3.1	2.3	3.9	5.1	W
Dominant Wavelength	min	λ_{dmin}	619	516	455	450	nm
	typ	λ_d	623	525	462	460	nm
	max	λ_{dmax}	630	535	469	468	nm
FWHM - Spectral bandwidth at 50% of Φ_v	typ	$\Delta\lambda_d$	19	38	20	20	nm
Color Saturation[7,8]	typ		1.00	0.77	0.99	0.99	
Chromaticity Coordinates[7,8]	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	Ω_{dyn}	0.07	0.08	0.07	0.05	Ω
Device Thermal Characteristics and Lifetime							
Thermal Coefficient of Photometric Flux	typ		-0.9	-0.2	~0	~0	% / °C
Thermal Coefficient of Radiometric Power	typ		-0.5	-0.2	-0.2	-0.2	% / °C
Temperature Coefficient of Forward Voltage	typ		-1.5	-1.0	-3.0	-3.0	mV / °C
Median Lifetime[9]			>60,000	>60,000	>60,000	>60,000	Hours

Optical and Electrical Characteristics

		Symbol	Red	Green	Blue	EP-Blue[1] Preliminary	Unit
Bin Kit			MPB	MPB	MPB	EPA	A
Characteristics at Reference Continuous Drive Current I_F(continuous wave)[2]							
Reference Drive Current	typ	I_F	5.9	5.9	5.9	5.9	A
Luminous Flux	typ	Φ_v	305	770	140	155	lm
Radiometric Power	typ	Φ_r	1.7	1.5	2.5	3.4	W
Dominant Wavelength	typ	λ_d	624	528	464	462	nm
FWHM - Spectral bandwidth at 50% of Φ_v	typ	$\Delta\lambda_d$	18	38	21	21	nm
Color Saturation[7,8]	typ		1.00	0.84	0.99	0.99	
Chromaticity Coordinates[7,8]	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}	3.2	5.3	5.3	4.6	V
Dynamic Resistance	typ	Ω_{dyn}	0.08	0.12	0.07	0.05	Ω

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} = 40ºC. See Thermal Resistance section for T_{hs} definition.

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



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.
Note 7: In CIE 1931 chromaticity diagram coordinates, normalized to X+Y+Z=1
Note 8: For Reference only
Note 9: Estimated median lifetime, assuming Tj<80ºC for Red devices , Tj<115ºC for Blue devices and Tj<125ºC for Green devices

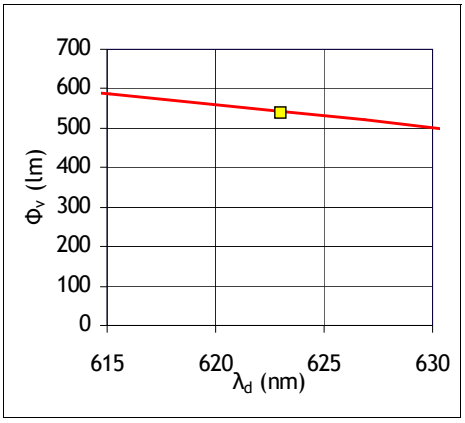
Absolute Maximum Ratings

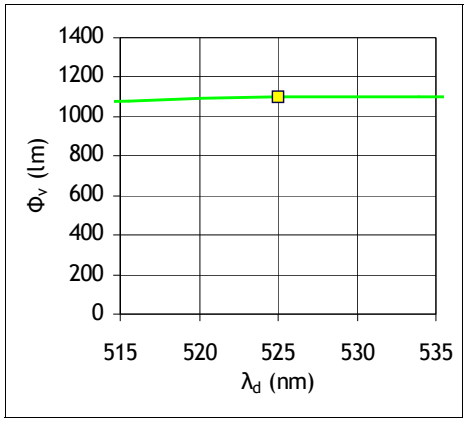
		Symbol	Red	Green	Blue	EP-Blue	Unit
Maximum Current[1]	Max		12	12	12	12	A
Absolute Maximum Junction Temperature[2]	Max	T_{jmax}	110	170	170	170	°C
Storage Temperature Range			-40/+100	-40/+100	-40/+100	-40/+100	°C

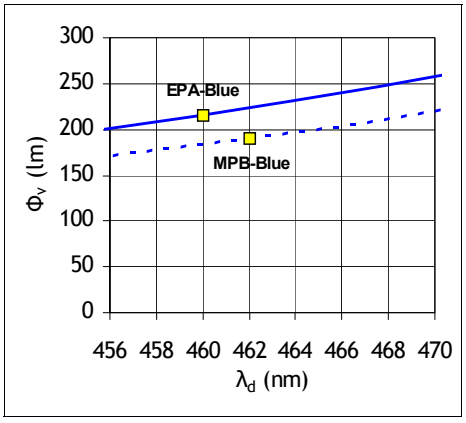
Note 1: Luminus PhlatLight LEDs are designed for operation to an absolute maximum forward drive current density of 2.5A/mm2 cw, and 3A/mm2 pulsed (f>240Hz, duty cycle < 60%). Please refer to absolute maximum rating table above for specific absolute maximum currents for the products covered in this datasheet.
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 for further information.
In pulsed operation, rise time from 10 to 90% of forward current should be larger than 0.5 microseconds.

Note 2: Sustained operation above 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

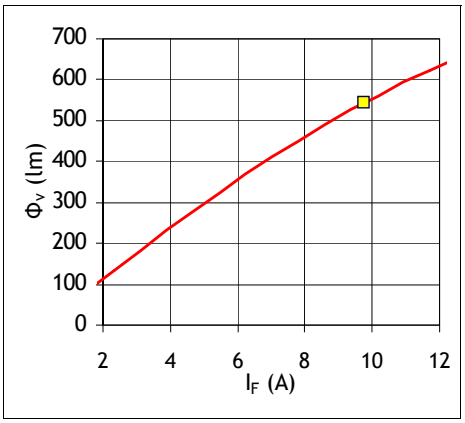


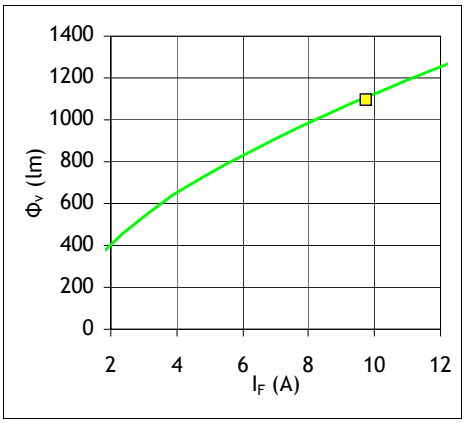


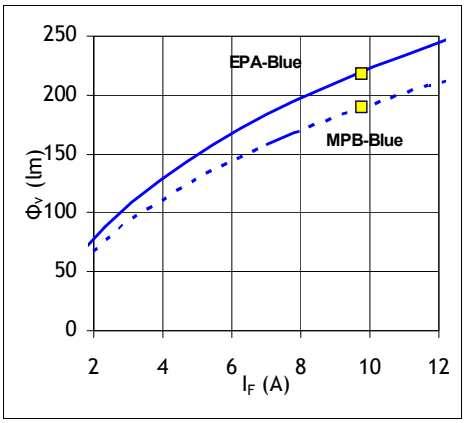


See note 1 on page 6.

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

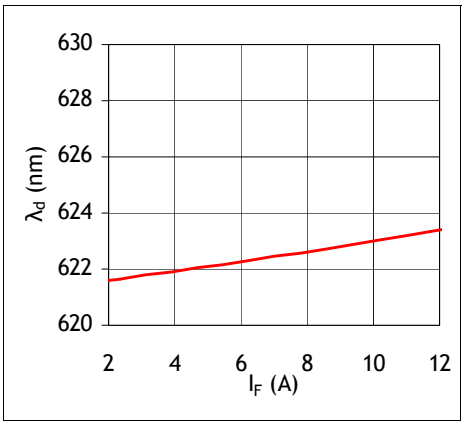


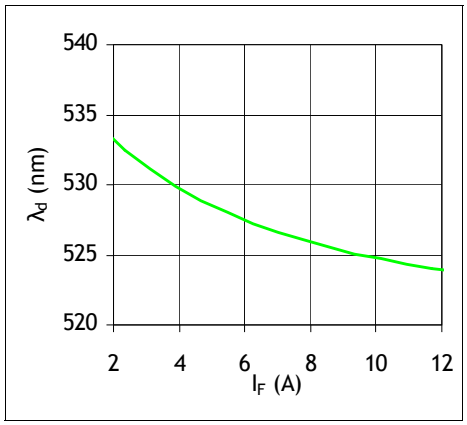


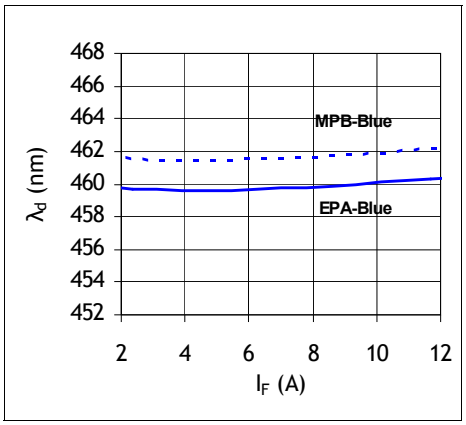


See notes 1,2 on page 6.

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

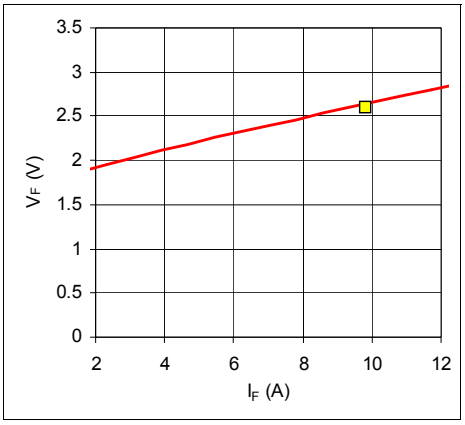


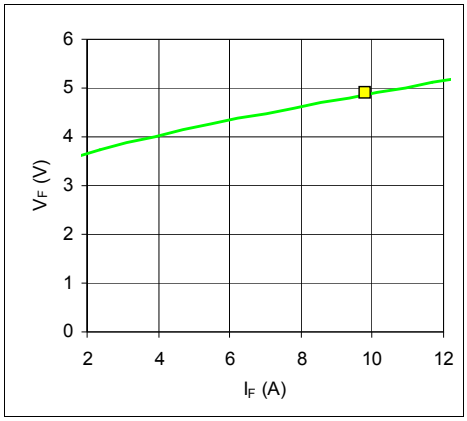


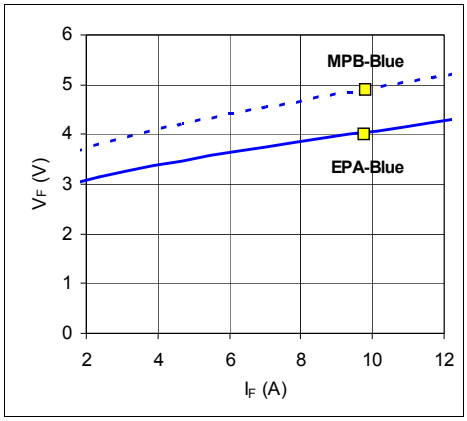


See notes 1,2 on page 6.

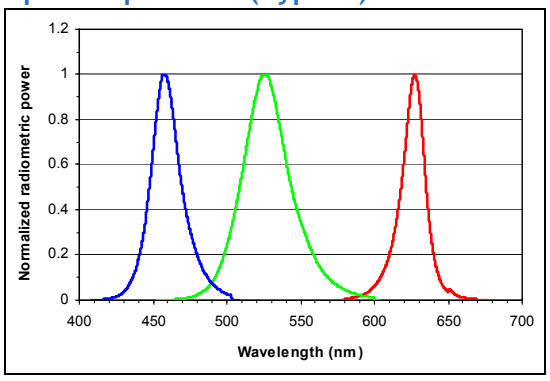
Forward Voltage variation with Drive current - $V_F = f(I_F)$ - Typical







Optical Spectrum (Typical)



See note 3 on page 6.

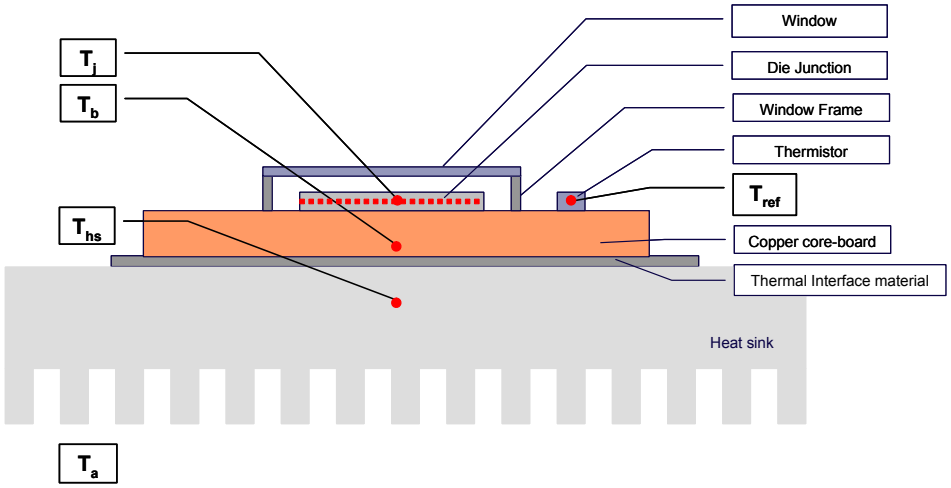
Chart Notes

Note 1: *For Pulsed operation, typical RGB duty cycles used are 25%, 50% and 25% respectively (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]	1.6 °C/W
$R_{\theta b\text{-}hs}$ [2]	0.2 °C/W
$R_{\theta j\text{-}hs}$ [1,2]	1.8 °C/W
$R_{\theta j\text{-}ref}$ [2]	1.6 °C/W

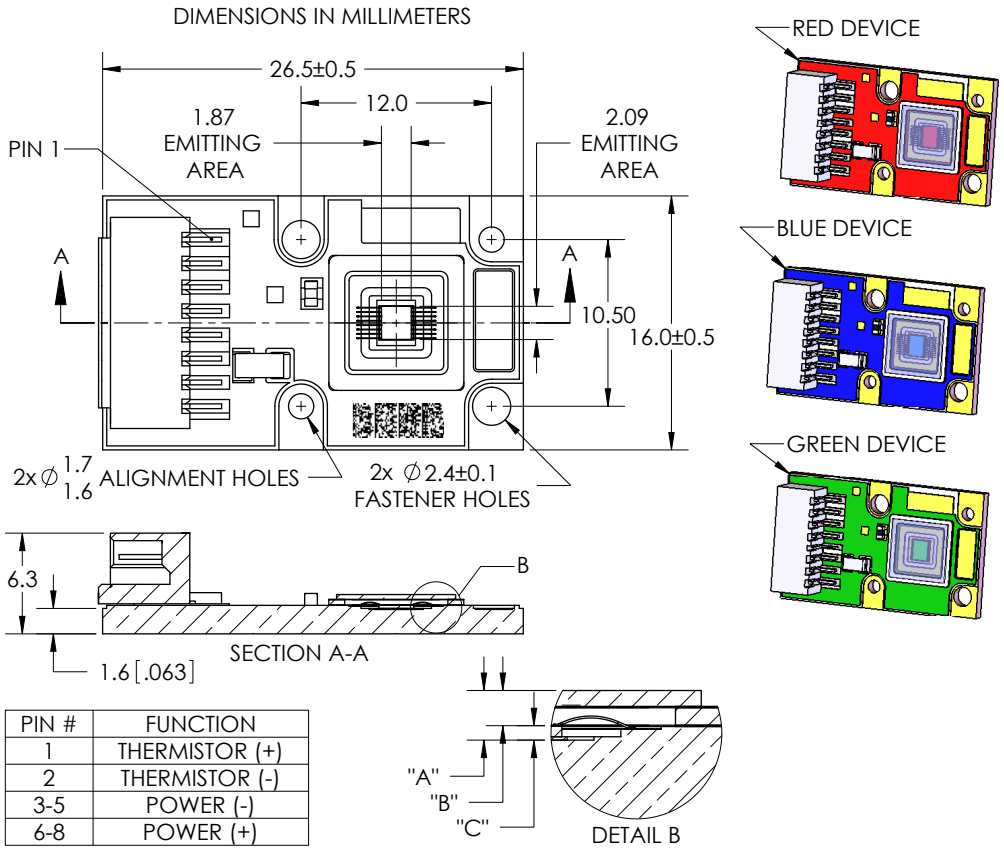
Note 1: Thermal resistance values are based on finite element analysis model results correlated to measured $R_{\theta j\text{-}hs}$ data.

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.

Mechanical Dimensions (Standard Die Configuration)



PIN #	FUNCTION
1	THERMISTOR (+)
2	THERMISTOR (-)
3-5	POWER (-)
6-8	POWER (+)

DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	TOP OF METAL SUBSTRATE TO TOP OF GLASS	0.94	±0.13
"B"	EMITTING AREA TO TOP OF GLASS	0.67	± 0.16
"C"	TOP OF METAL SUBSTRATE TO EMITTING AREA	0.27	± 0.05

DWG-001263

- *Red, Green and Blue PT39 PhlatLight LEDs are individually assembled into a Type CX, Common Anode Copper Core-Board with a footprint of 26.5 mm x 16 mm.*
- *Dimension above for information only. For detailed dimensions, always refer to the latest revision of the DWG-001263 package outline*
- *Connector: MOLEX. Part Number: 874380843. Please refer to DWG-001263 for pin-out information*

Ordering Information

Customer Part Number	Die Configuration	Color	Description
PT-39-R-C21-MPB	**Standard**	**Red**	Bin Kit MPB Red PhlatLight PT39 consisting of a 3.9 mm^2 LED, thermistor and connector mounted on a type CX copper-core PCB
PT-39-G-C21-MPB		**Green**	Bin Kit MPB Green PhlatLight PT39 consisting of a 3.9 mm^2 LED, thermistor and connector mounted on a type CX copper-core PCB
PT-39-B-C21-MPB		**Blue**[1]	Bin Kit MPB Blue PhlatLight PT39 consisting of a 3.9 mm^2 LED, thermistor and connector mounted on a type CX copper-core PCB
PT-39-B-C21-EPA		**EP-Blue**[2]	Bin Kit EPA Blue PhlatLight PT39 consisting of a 3.9 mm^2 LED, thermistor and connector mounted on a type CX copper-core PCB

Note 1: Not recommended for new designs
Note 2: Bin Kit EPA is recommended for new designs.

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