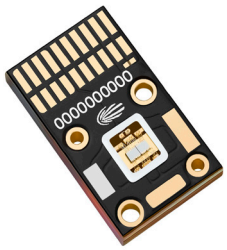
PTM-50X-B/BP

Projection

Blue and Blue Pump LED



Features

- Blue and Blue Pump LED with 5.0 mm^2 emitting area designed for display
- Complement with PTM-50X Red Amber and Converted Green for best projection brightness and color gamut
- Dominant wavelength: Blue/Blue Pump 457/444 nm (Typ.)
- LED die precision mounted on low thermal resistance isolated MC-PCB package
- Thermistor pad allows option for precise thermal management
- Drive current up to 16 A
- Chipset array in series enabling lower drive current
- Windowless package allows for closer collection optics and brighter system solutions
- LED emitting area optimized for micro-display diagonal sizes ranging from 0.45" to 0.65"

Table of Contents

Applications

- Specifically engineered for Pico front projectors, head-up projection displays and hybrid projectors
- Suitable for DLP™, LCoS and HTPS /3LCD microdisplays

Ordering Information

Ordering Part Numbers[1]

Color	Radiometric Flux[2]		Bin kit Ordering Code	Wavelength Bin	Ordering Part Number[3]
	Min. Flux Bin	Min. Power			
Blue	4F	19.6 W	EPF	B6, B7	PTM-50X-B-L34-EPF
	4G	21.3 W	EPG	B6, B7	PTM-50X-B-L34-EPG
Blue Pump	4G	21.3 W	EPG	B0, B1	PTM-50X-BP-L34-EPG
	4H	23.3 W	EPH	B0, B1	PTM-50X-BP-L34-EPH

Part Number Nomenclature

PTM	50X	##	L34	<Bin kit>
Product Family	**Chip Area**	**Color**	**Package Configuration**	**Bin Kit[4,5]**
PTM: Projection Technology Multi-Die	50: 5.0 mm^2 X: Isolated	B: Blue BP: Blue Pump	L34: No Connector, Core board, Windowless (See Mechanical Drawing section)	Refer to ordering part numbers in this document

Note:

1. Ordering part numbers represent bin kits (group of bins that are shippable for a given ordering part number)
2. Flux Bin listed is minimum bin shipped, higher bins may be included at Luminus' discretion.
3. Ordering Part number is default to L34 package configuration.
4. Individual flux bins are not orderable.
5. See Bin Kit and Flux / Power bin definitions on page 3.

Binning Structure

Flux Bins[1,2]

Color	Radiometric Flux Bin[3]	Binning @ 10 A, T_j= 25°C[4,5]	
		Minimum Power (W)	Maximum Power (W)
Blue / Blue Pump	4F	19.6	21.3
	4G	21.3	23.3
	4H	23.3	25.3
	4J	25.3	27.3

Dominant Wavelength Bins[1,2]

Color	Wavelength Bin[3]	Binning @ 10 A, T_j= 25°C[4,5]	
		Minimum Wavelength (nm)	Maximum Wavelength (nm)
Blue Pump	B0	441	447
	B1	447	450
Blue	B6	453	460
	B7	460	465

Note:

1. Luminus maintains a +/- 6% tolerance on flux and power measurements, and a +/- 1nm tolerance on wavelength measurements.
2. Products are production tested then sorted and packed by bin.
3. Individual bins are not orderable. Please refer to the Product Ordering information page for a list of orderable bin kits.
4. Product test condition: 10 A, 20 ms single pulse, 25°C = heat sink temperature = T_{hs}= T_j
5. T_j= Junction temperature.
6. Wavelength bins are not orderable. Wavelength bins are displayed in product label.

Absolute Maximum Ratings

	Symbol	Values	Unit
Absolute Maximum Reverse Drive Current (CW or Pulsed)[1,2]	$I_{r\,max}$	0	mA
Absolute Minimum Forward Current (CW or Pulsed)[2]	$I_{f\,min}$	0.2	A
Absolute Maximum Forward Current (CW)[3]	$I_{f\,max\,CW}$	13.0	
Absolute Maximum Forward Current (Pulsed)[3,4] (Frequency > 240Hz, duty cycle < 70%)	$I_{f\,max\,Pulsed}$	16.0	
Absolute Maximum Surge Current[3,4] (Frequency >240Hz, duty cycle = 10%, t=1ms)	$I_{surge\,max}$	17.0	A
Absolute Minimum Storage Temperature	$T_{s\,min}$	-40	°C
Absolute Maximum Storage Temperature	$T_{s\,max}$	100	
Absolute Maximum Junction Temperature	$T_{j\,max}$	150	°C
ESD sensitivity ANSI/ESDA/JEDEC JS-001 (HBM, Class 3A)	V_{ESD}	4000	V

Note:

1. Reverse Current Operation is not allowed.
2. Product performance and lifetime data is specified at recommended forward drive currents. Sustained operation at or near absolute minimum currents may result in a reduction of device performance and device lifetime compared to recommended forward currents.
3. Sustained operation above maximum currents is not recommended and will result in a reduction of device lifetime compared to specified maximum forward drive currents. Device lifetimes will depend on junction temperature.
4. In pulsed operation, rise time from 10% to 90% of forward current should be larger than 0.5 microseconds.

Device Characteristics

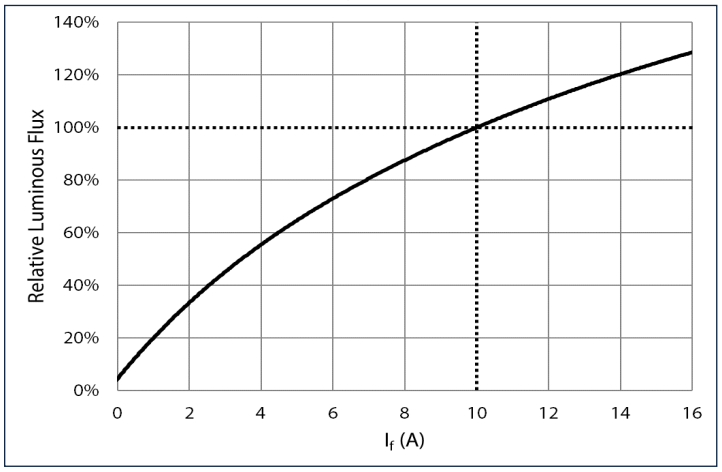
General Characteristics	Symbol	Blue	Blue Pump	Unit
Emitting Area	A_E	4.93	4.93	mm^2
Emitting Area Dimension		3.30 x 1.54	3.30 x 1.54	mm x mm
Optical and Electrical Characteristics[1]				
Test Pulse Duration		20	20	ms
Test Peak Drive Current[2]	I_f	10	10	A
Peak Luminous Flux[2]	φ_v	920	500	lm
Peak Radiometric Flux[2]	Φ_r	22.7	25.7	W
Forward Voltage	$V_{f\ min}$	6.8	6.8	V
	V_f	7.4	7.4	
	$V_{f\ max}$	8.0	8.0	
Dominant Wavelength	$\lambda_{d\ miin}$	453	440	nm
	λ_d	457	444	
	$\lambda_{d\ max}$	465	450	
Peak Wavelength	λ_p	453	436	nm
FWHM- Spectral bandwidth at 50% of Φ_r	$\Delta\lambda_{1/2}$	20	20	nm
Chromaticity Coordinates[3]	CIE x	0.15	0.16	
	CIE y	0.03	0.01	
Thermal Characteristics				
Thermal Resistance (junction to case) real[4]	$R_{\theta j\text{-}c\ real}$	0.68	0.68	°C/W
Thermal Resistance (junction to case) electrical[4]	$R_{\theta j\text{-}c\ electrical}$	0.46	0.44	°C/W

Note:

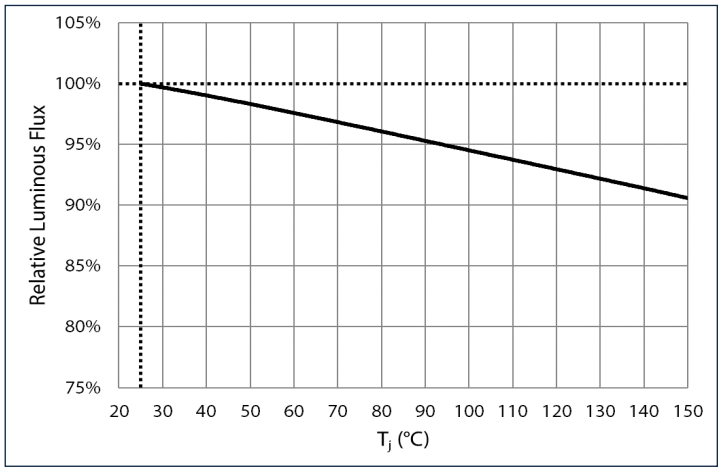
1. Characteristics at 10 A, 20 ms single pulse, 25°C
2. Unless otherwise noted, values listed are typical. All ratings are based on operation with a constant temperature = 25°C = T_{hs} = T_j
3. In CIE 1931 chromaticity diagram coordinates, normalized to X+Y+Z=1.
4. Measurements are in accordance with JEDEC 51-14.

Relative Luminous Flux - Blue

Forward current: $\varphi_v(I_f)/\varphi_v(10\ A)$, T_j = 25°C, 20 ms single pulse

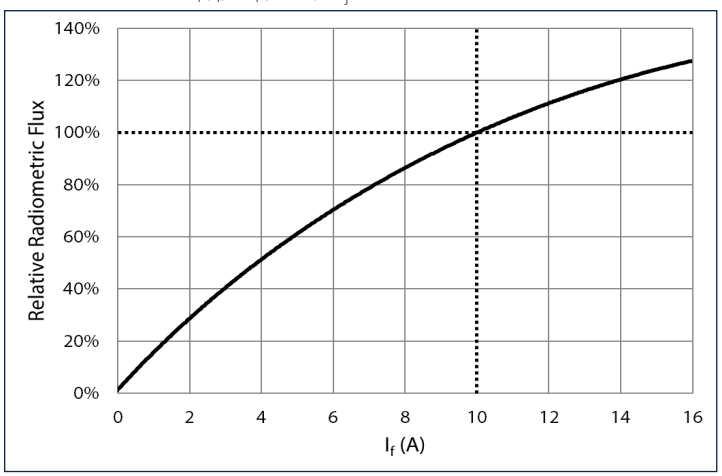


Temperature: $\varphi_v(T_j)/\varphi_v(25°C)$, I_f = 10 A, 20 ms single pulse

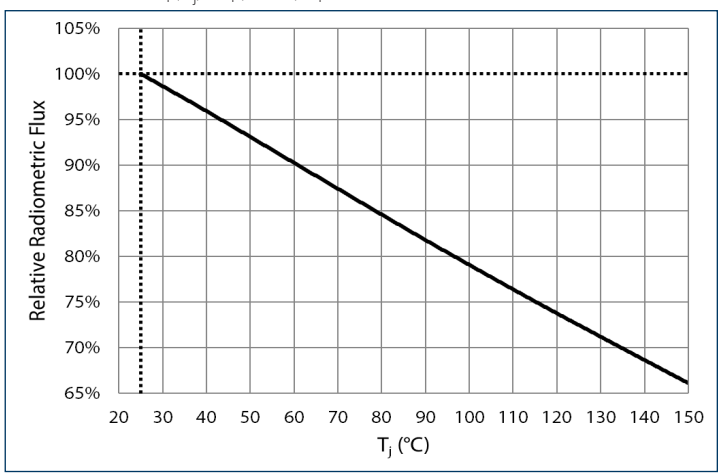


Relative Radiometric Flux - Blue

Forward current: $\Phi_r(I_f)/\Phi_r(10\ A)$, T_j = 25°C, 20 ms single pulse

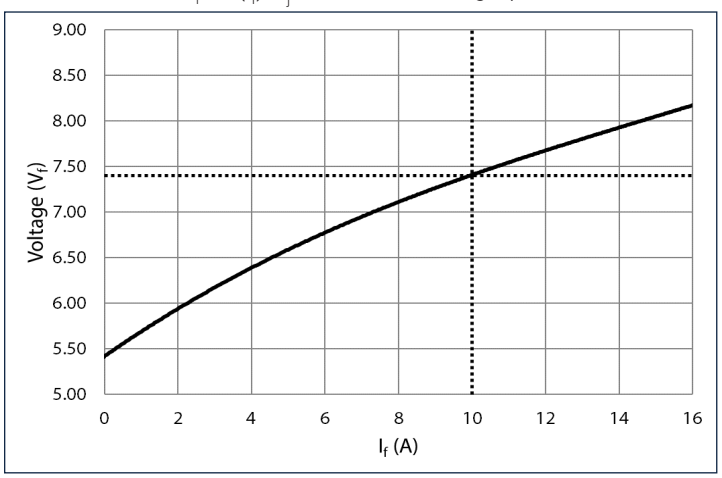


Temperature: $\Phi_r(T_j)/\Phi_r(25°C)$, I_f = 10 A, 20 ms single pulse

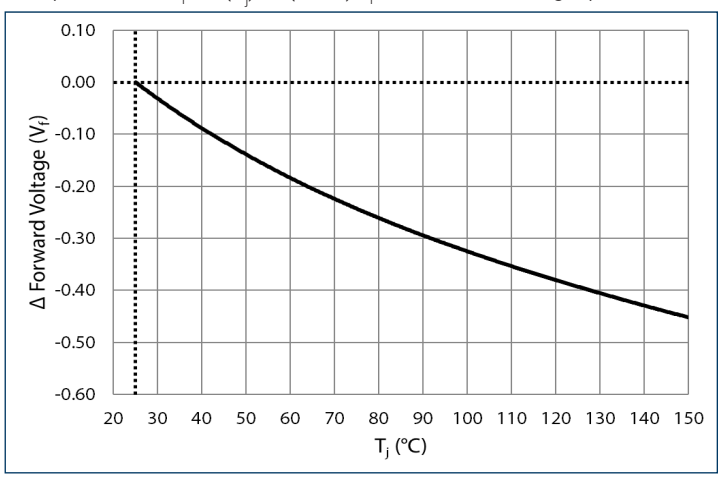


Forward Voltage - Blue

Forward current: $V_f = V(I_f)$, T_j = 25°C, 20 ms single pulse

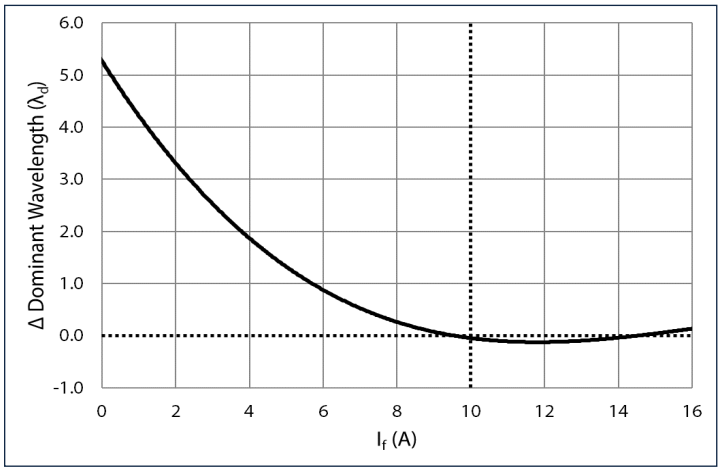


Temperature: $\Delta V_f = V(T_j) - V(25°C)$, I_f = 10 A, 20 ms single pulse

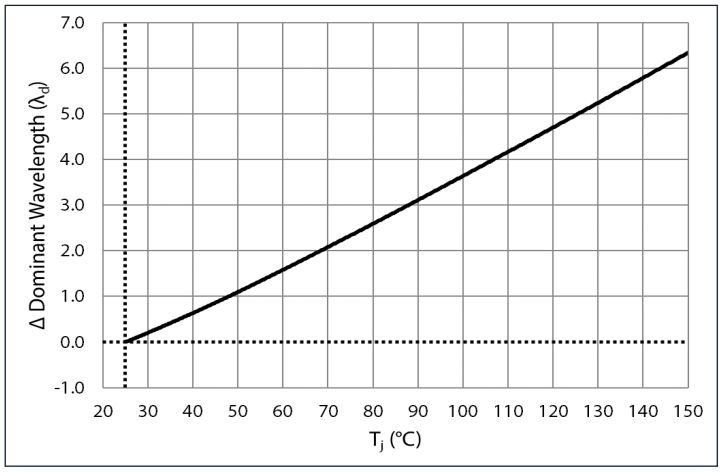


Dominant Wavelength Shift - Blue

Forward current: $\Delta\lambda_d = \lambda_d(I_f) - \lambda_d(10\ A)$, $T_j = 25°C$, 20 ms single pulse

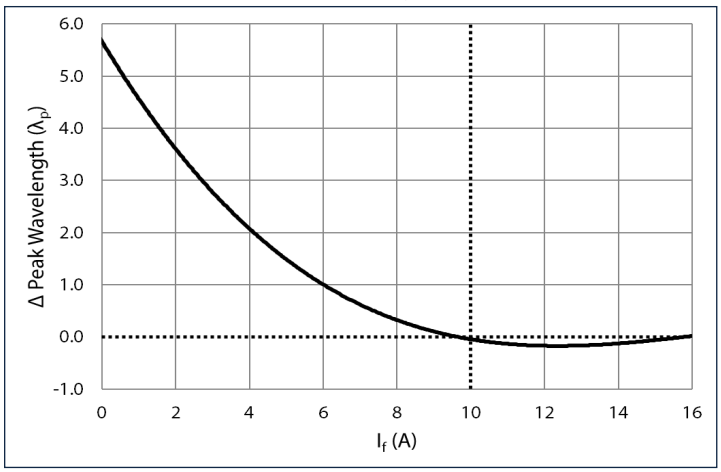


Temperature: $\Delta\lambda_d = \lambda_d(T_j) - \lambda_d(25°C)$, $I_f = 10\ A$, 20 ms single pulse

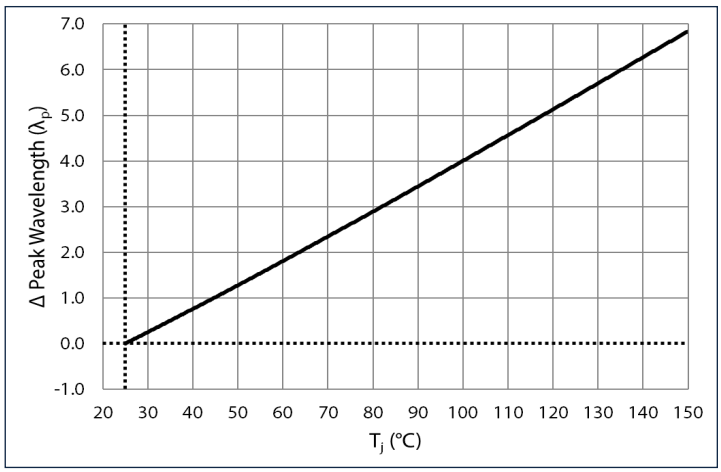


Peak Wavelength Shift - Blue

Forward current: $\Delta\lambda_p = \lambda_p(I_f) - \lambda_p(10\ A)$, $T_j = 25°C$, 20 ms single pulse

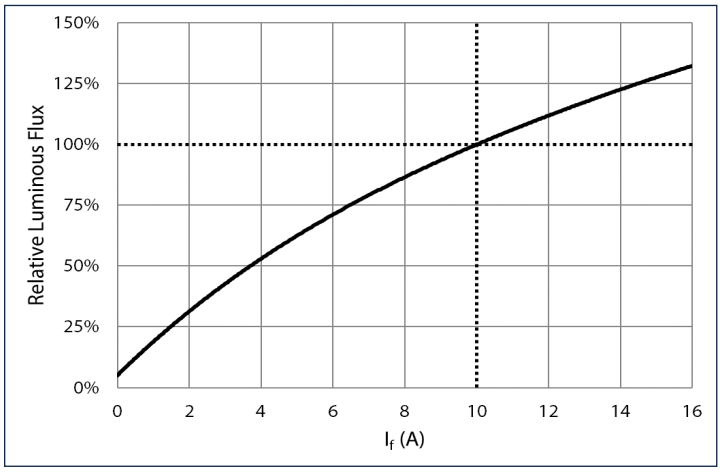


Temperature: $\Delta\lambda_p = \lambda_p(T_j) - \lambda_p(25°C)$, $I_f = 10\ A$, 20 ms single pulse

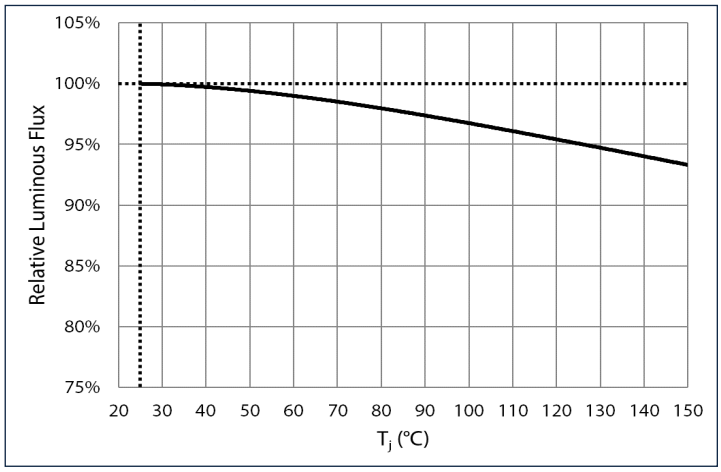


Relative Luminous Flux - Blue Pump

Forward current: $\varphi_v(I_f)/\varphi_v(10\ A)$, T_j = 25°C, 20 ms single pulse

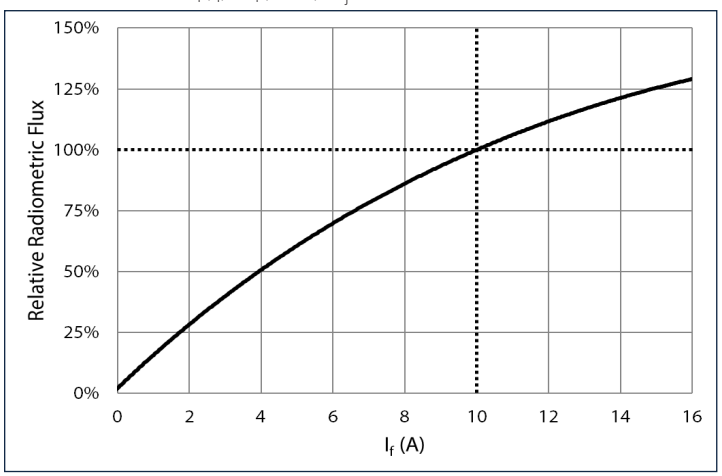


Temperature: $\varphi_v(T_j)/\varphi_v(25°C)$, I_f = 10 A, 20 ms single pulse

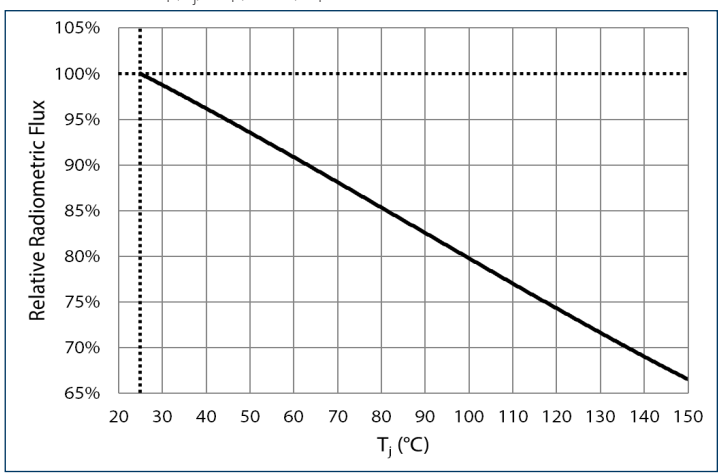


Relative Radiometric Flux - Blue Pump

Forward current: $\Phi_r(I_f)/\Phi_r(10\ A)$, T_j = 25°C, 20 ms single pulse

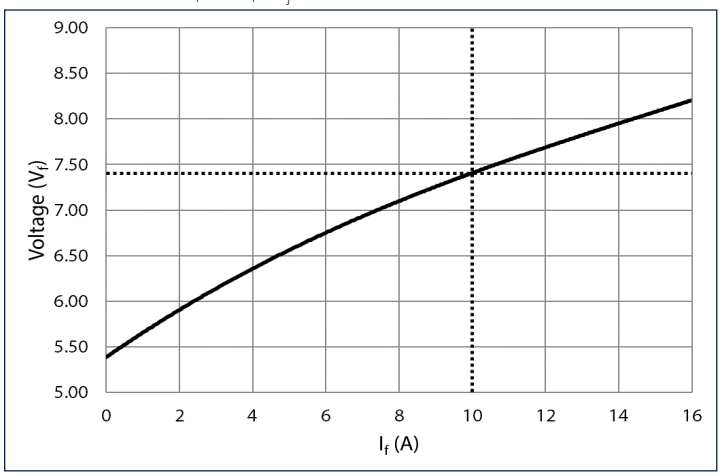


Temperature: $\Phi_r(T_j)/\Phi_r(25°C)$, I_f = 10 A, 20 ms single pulse

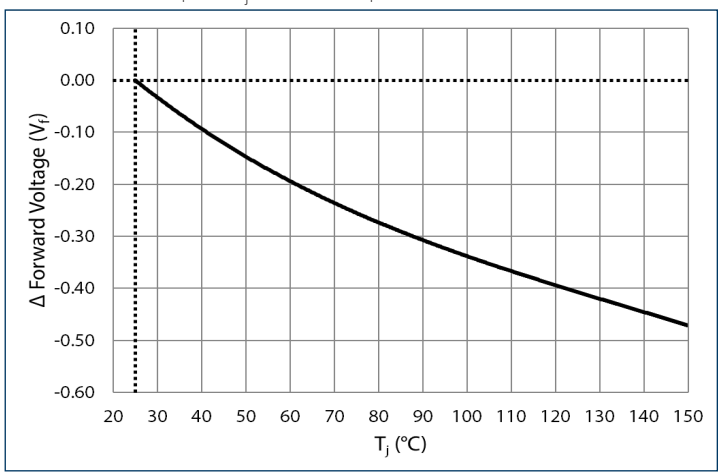


Forward Voltage - Blue Pump

Forward current: $V_f = V(I_f)$, T_j = 25°C, 20 ms single pulse

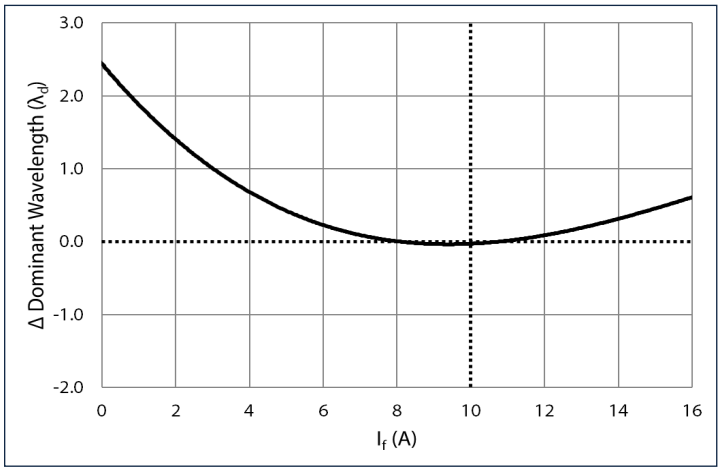


Temperature: $\Delta V_f = V(T_j) - V(25°C)$, I_f = 10 A, 20 ms single pulse

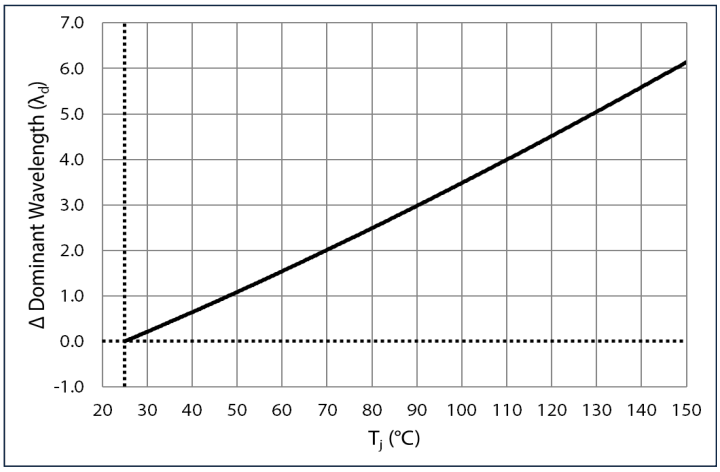


Dominant Wavelength Shift - Blue Pump

Forward current: $\Delta\lambda_d = \lambda_d(I_f) - \lambda_d(10\ A)$, $T_j = 25°C$, 20 ms single pulse

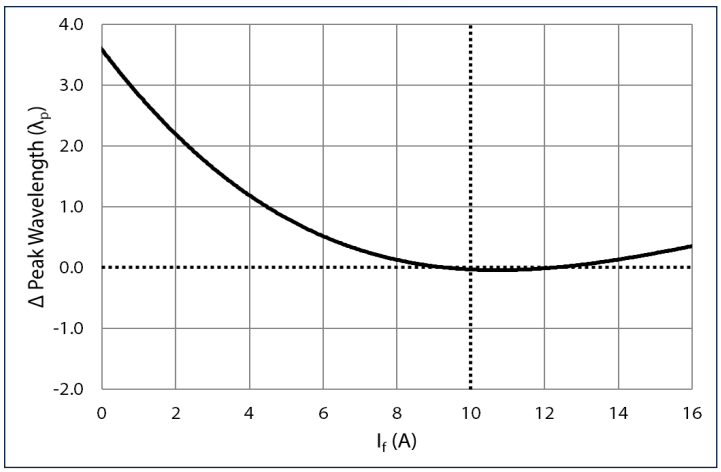


Temperature: $\Delta\lambda_d = \lambda_d(T_j) - \lambda_d(25°C)$, $I_f = 10\ A$, 20 ms single pulse

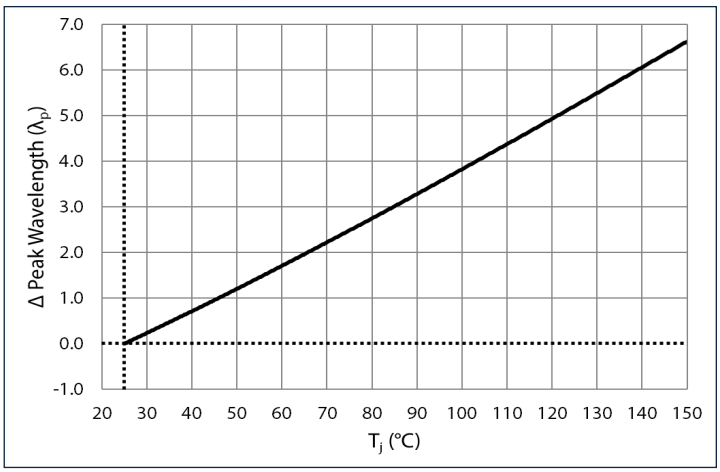


Peak Wavelength Shift - Blue Pump

Forward current: $\Delta\lambda_p = \lambda_p(I_f) - \lambda_p(10\ A)$, $T_j = 25°C$, 20 ms single pulse



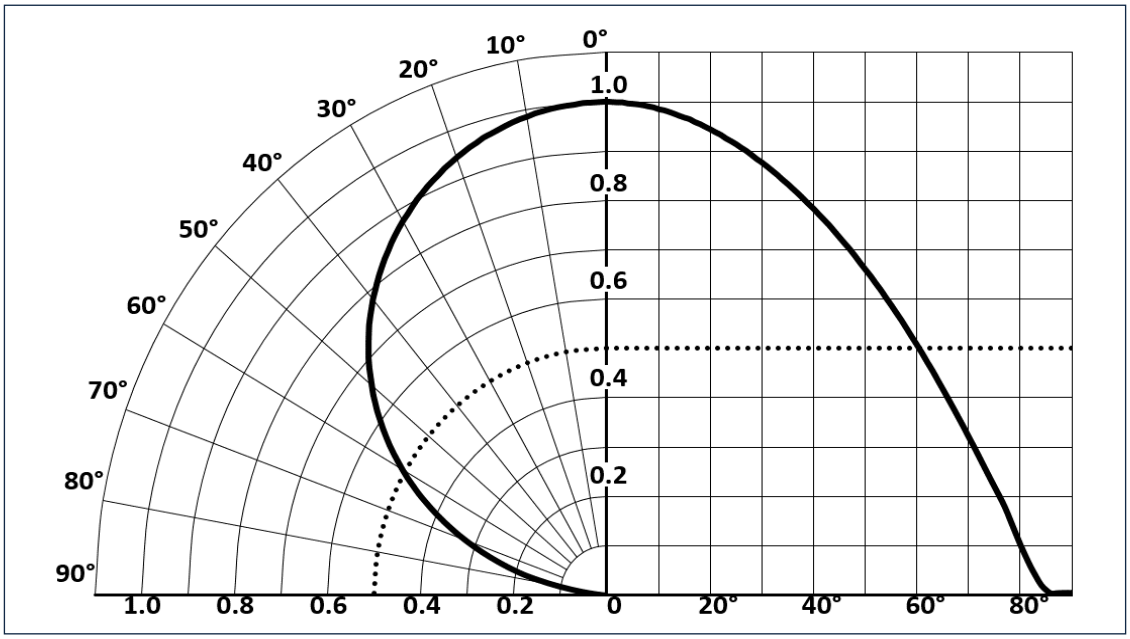
Temperature: $\Delta\lambda_p = \lambda_p(T_j) - \lambda_p(25°C)$, $I_f = 10\ A$, 20 ms single pulse



Angular Distribution and Typical Spectrum

Angular Intensity Distribution[1]

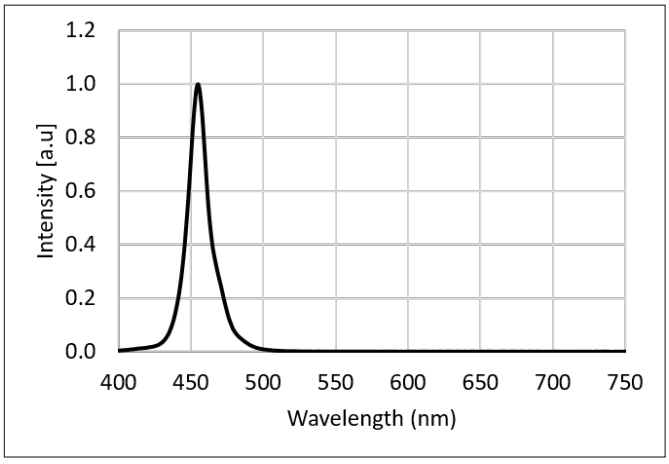
$I_{ref} = f(\Phi)$; $T_j = 25°C$



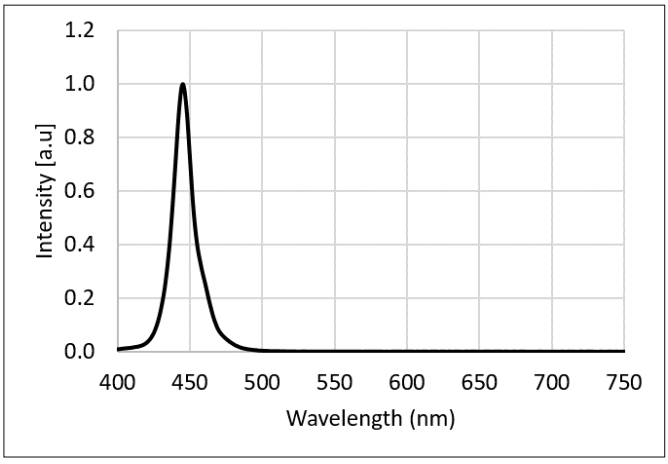
Typical Spectrum[2]

$\Phi_{ref} = f(\lambda)$; $I_f = 10$ A; $T_j = 25°C$

Blue



Blue Pump

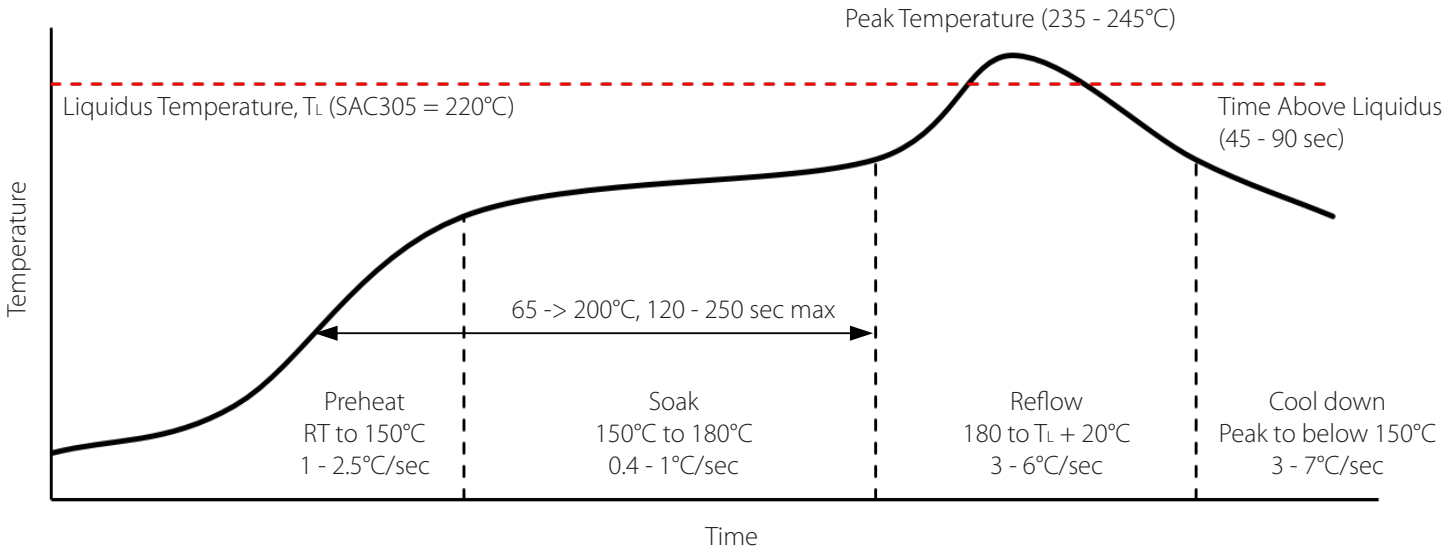


Note:

1. For any specific device, slight variations may be expected.

2. Typical spectrum at recommended peak drive current. Please contact Luminus to obtain data in Excel format.

Soldering Profile



SMT Rework Guideline	Manual Hotplate Reflow	Hot Air Gun Reflow
Heating Time	< 60 sec	
Hotplate Temperature	< 245°C	< 150°C

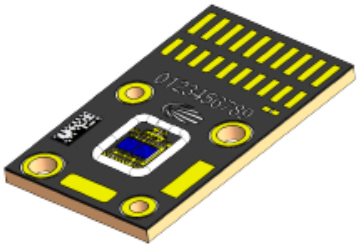
Note:

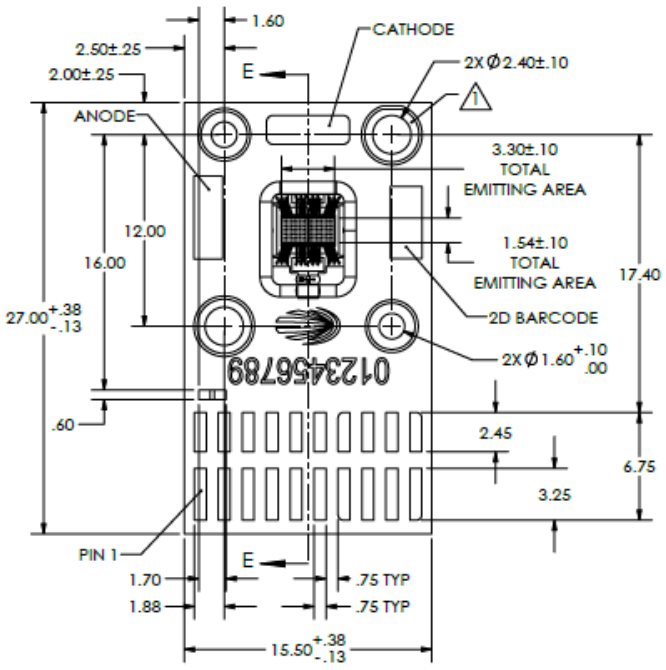
1. Product complies to Moisture Sensitivity Level 1 (MSL 1).
2. The numbers in the table are specific to SAC305. Luminus recommends using an SAC305 solder paste with a no-clean flux for RoHS compliant products.
3. During the pick and place process, ensure the pick-up tool does not touch any die components.
4. Use of a multi-zone IR reflow oven with a nitrogen blanket is recommended.
5. Time-temperature profile of the reflow process showing the four functional profile zones are defined in IPC-7801. Temperature is referenced to the center of the PCB.
6. Luminus recommends to use the solder paste data sheet information as a starting point in time-temperature process development.
7. These are general guidelines. Consult the solder paste manufacturer's datasheet for guidelines specific to the alloy and flux combination used in your application. For more information, please refer to:

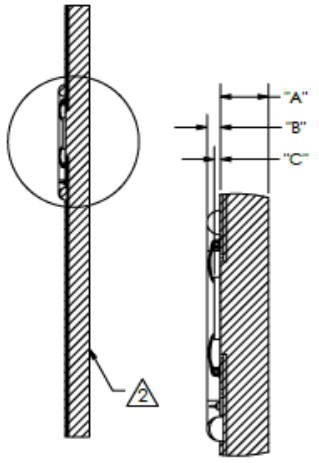
   https://luminusdevices.zendesk.com/hc/en-us/articles/360060306692-How-do-I-Reflow-Solder-Luminus-SMD-Components-
8. For any technical questions about soldering process, please contact Luminus at techsupport@luminus.com.

Mechanical Dimensions

DIMENSIONS IN MILLIMETERS



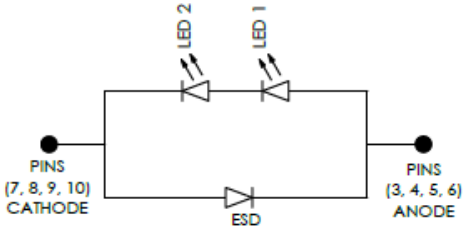




SECTION E-E

NOTES:

1. METAL SUBSTRATE PLATED AREAS AROUND HOLES ARE COPLANAR WITH CATHODE AND ANODE PADS.
2. METAL SUBSTRATE PLATED AREAS AROUND HOLES ARE ELECTRICALLY CONNECTED TO THE BACKSIDE OF COREBOARD. THEY ARE ELECTRICALLY ISOLATED FROM THE CATHODE, ANODE AND THERMISTOR.



LED CIRCUIT DIAGRAM

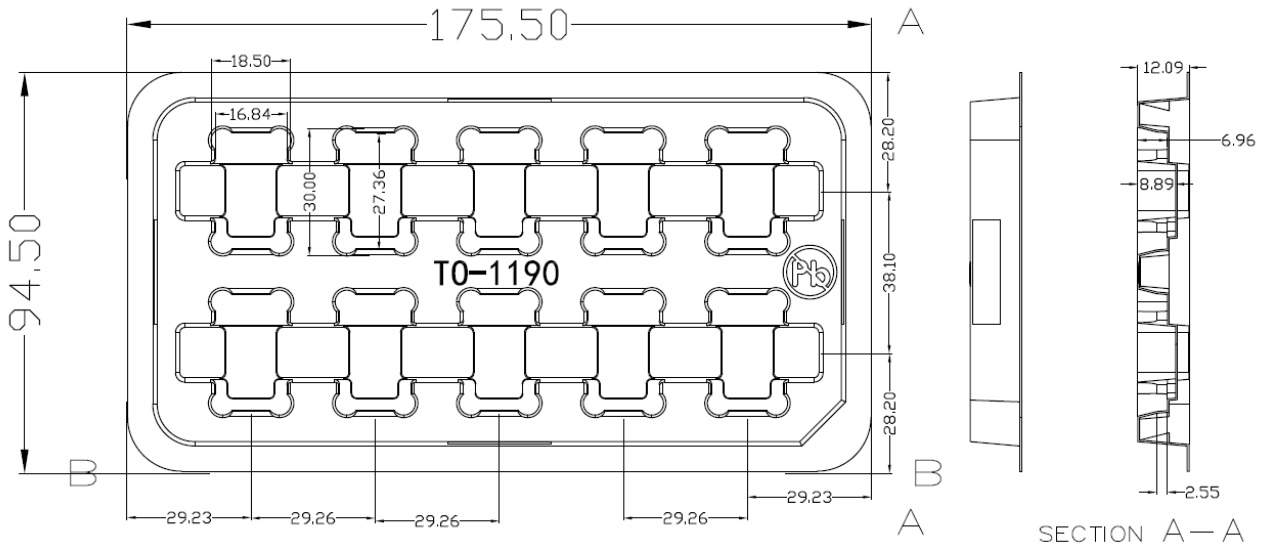
PIN ASSIGNMENT	
THERMISTOR	1,2
ANODE (+)	3,4,5,6
CATHODE (-)	7,8,9,10

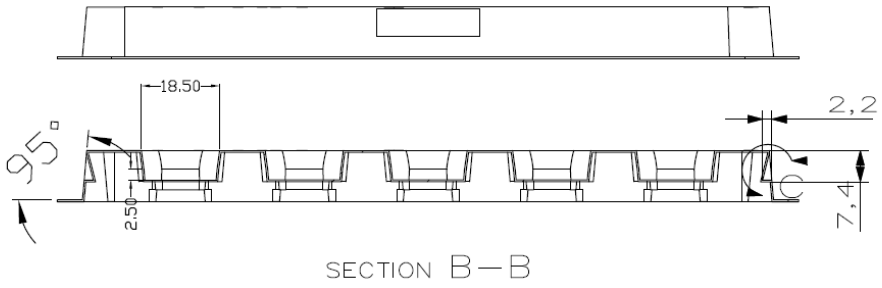
DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	TOP OF METAL SUBSTRATE TO BACK OF COREBOARD	1.50	±.10
"B"	TOP OF METAL SUBSTRATE TO TOP OF DAM	.42	±.04
"C"	TOP OF METAL SUBSTRATE TO TOP OF EMITTING AREA	.20	±.02

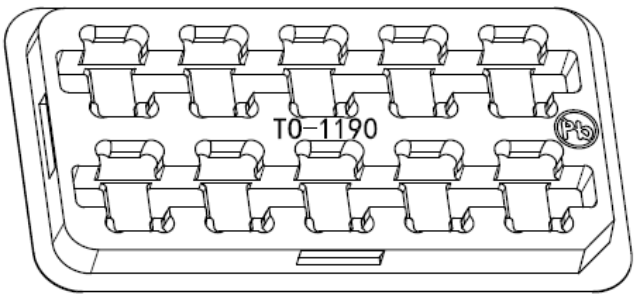
Note:

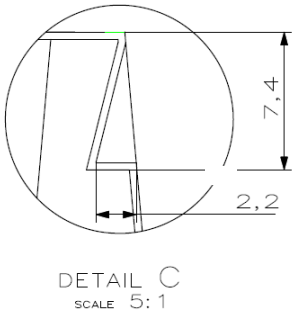
1. Die Tilt: 1° Maximum, Die Rotation: ±1°.
2. Contact within silicone dam area is prohibited.
3. Recommended connector: Manufacturer: Tarng-Yu; Part# TU1502WGR-10S-GO-M8-NL-A.
4. Recommended female connector: Manufacturer: Tarng-Yu; Part# TU1502HNO-10; contact terminal part#TU1502TGO-GO.
5. LED coreboard backside is electrically isolated.
6. LED emitter and wirebond not covered, contact within the silicone dam area is prohibited.

Shipping Tray Outline





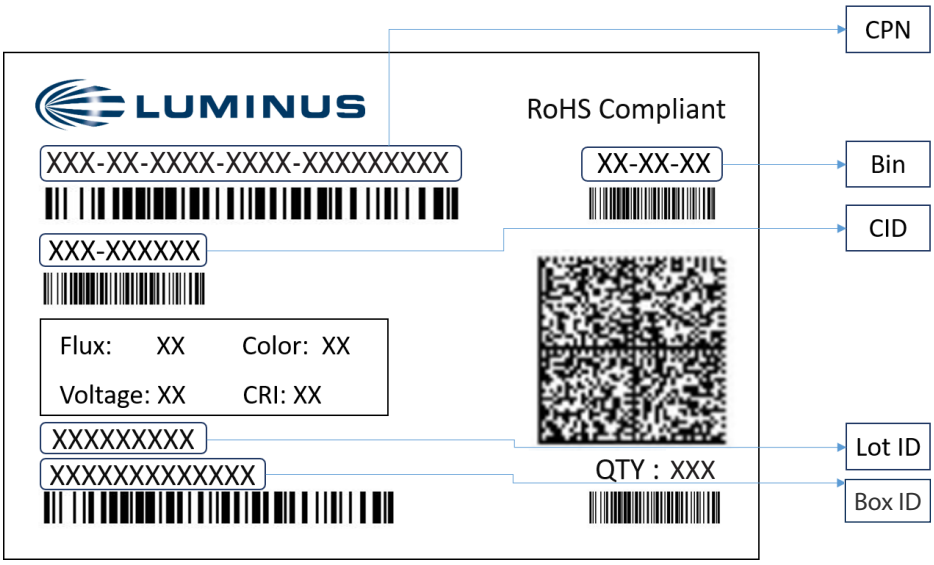




Note:

1. Each tray contains 10 units.
2. All dimensions are in millimeter ± 0.25 mm.
3. For detailed drawing of shipping tray, please refer to document TO-1190, available upon request.

Shipping Label



Label Fields:

- CPN: Luminus ordering part number
- CID: Customer's part number
- QTY: Quantity of devices in pack
- Flux: Bin as defined on page 3
- Voltage: NA
- Color: Bin as defined on page 3
- CRI: NA

Packing Configuration:

- Stack of 5 trays with 10 devices per tray
- Partial pack or tray may be shipped
- Each pack is enclosed in anti-static bag
- Shipping label is placed on top of each pack

Notes

Static Electricity

This product is sensitive to static electricity, and care should be taken when handling them. Static electricity or surge voltage will damage the LEDs. It is recommended to wear an anti-electrostatic wristband or anti-electrostatic gloves when handling the LEDs. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken to isolate LED processing equipment from potential sources of voltage surges.

Reference: APN-002815 Electrical Stress Damage to LEDs and How to Prevent It

Eye Safety

According to the test specification risk group IEC 62471: 2006-Non-GLS under 10 A, this product complies to Risk group 3 (RG3) High risk.

Do not stare at operating lamp, eye injury may result.

For more information, please refer to: https://luminusdevices.zendesk.com/hc/en-us/articles/10532958752397

Revision History

Rev	Date	Description of Change
01	06/27/2024	Initial release