PT-39-L51
Thermally Enhanced Deep Red and Green LED Chipset

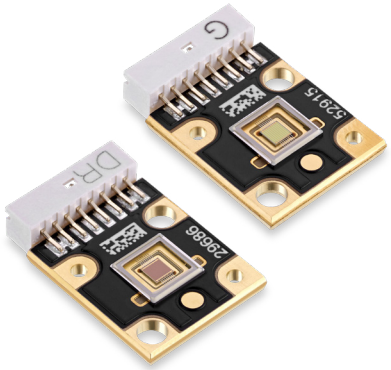

Table of Contents

Features:

- Matched Chipset with 2.09 mm × 1.87 mm (3.9 mm^2) emitting area
- Ultra-low thermal resistance, 1.2°C/W junction-to-heat sink
- Targeted peak wavelengths: Deep-red 650 nm, Green 520 nm
- LED mounted on copper core-PCB for easier thermal and optical integration
- RoHS (EU-2002/95/EC Directive) and REACH compliant

Applications

- Life Sciences
- Medical
- Microdisplay
- Fiber Coupling
- Horticulture

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Technology Overview

Luminus 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.

Luminus Technology

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

Packaging Technology

Thermal management is critical in high power LED applications. Luminus PT-39 LEDs have the lowest thermal resistance of any LED on the market with a thermal resistance from junction to heat sink of 1.2°C/W. 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.

Environmental Benefits

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

Reliability

Luminus LEDs are designed from the ground up to deliver one of the most reliable light sources in the world today. Luminus 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 LEDs are ready for even the most demanding applications.

Static Electricity

The products are sensitive to static electricity, and care should be taken when handling them. Static electricity or surge voltage willdamage the LEDs. It is recommended to wear an anti-electrostatic wristband or an anti-electrostatic gloves when handling the LEDs. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.

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

Understanding Luminus 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°C heat sink. This method of measurement ensures that Luminus LEDs perform in the field just as they are specified.

Operating Points

The tables on the following pages provide typical optical and electrical characteristics. The LEDs can be operated over a wide range of drive conditions(currents from <1A to 12 A, and duty cycle from <1% to 100%).

PT-39 devices are production specified at 7.5 A. Any other values shown are for additional reference at other possible drive conditions.

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Ordering Information

Ordering Part Numbers

Color	Radiometric Power		Wavelength Bins	Ordering Part Number
	Min. Flux Bin	Min. Power		
Deep Red	BD	2.6 W	R10, R11	PT-39-DR-L51-BD100
Green	CD	2.6 W	G2, G3, G4, G5	PT-39-G-L51-CD100-R2

Part Number Nomenclature

PT — 39 — CC — L51 — <Bin kit>

Product Family	Chip Area	Color	Package Configuration	Bin Kit [1]
PT: Metal Coreboard PCB	39: 3.9 mm^2	DR= Deep Red G= Green	Internal package code	Refer to ordering part numbers in this document

Note 1: Flux Bin listed is minimum bin shipped, higher bins may be included at Luminus' discretion.

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Binning Structure

PT-39 LEDs are specified for luminous flux and chromaticity/wavelength at a drive current of 7.5 A (1.92 A/mm2) and placed into one of the following Power Bins and Wavelength Bins:

Flux Bins

Color	Luminous Flux Bin (FF)[3]	Binning @ 7.5A, T_{hs} = 40°C[5]	
		Minimum Power (W)	Maximum Power (W)
Deep Red	BD	2.6	2.8
	BE	2.8	3.0
	BF	3.0	3.2
	BG	3.2	3.4
	BH	3.4	3.6
	BJ	3.6	3.8
	BK	3.8	4.0
Green	CD	2.6	2.8
	CE	2.8	3.0
	CF	3.0	3.2
	CG	3.2	3.4
	CH	3.4	3.6

Peak Wavelength Bins

Color	Wavelength Bin[3]	Binning @ 7.5A, T_{hs} = 40°C[5]	
		Minimum Wavelength (nm)	Maximum Wavelength (nm)
Deep Red	R10	645	650
	R11	650	655
Green	G2	510	515
	G3	515	520
	G4	520	525
	G5	525	530

Note 1: Luminus maintains a +/- 6% tolerance on flux measurements.

Note 2: Products are production tested then sorted and packed by bin.

Note 3: Individual bins are not orderable. Please refer to the Product Ordering information page for a list of orderable bin kits.

Note 4: Product test condition: 7.5A DC, 40°C heat sink temperature.

Note 5: T_{hs}=Testing Heat Sink Temperature.

Note 6: The wavelength bin as marked on the product label may be followed by a letter which is for internal use only.

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Typical Device Performance[1,2]

General Characteristics		Symbol	Deep Red	Green	Unit
Emitting Area			3.9	3.9	mm^2
Emitting Area Dimensions			1.87 x 2.09	1.87 x 2.09	mm x mm
Characteristics at Recommended Test Drive Current , I_F[2,3]					
Test Drive Current	typ	I_F	7.5	7.5	A
Luminuous Flux[5]	typ	Φ_v	N/A	1385	lm
Radiometric Flux[5]	typ	Φ_r	2.7	2.85	W
Dominant Wavelength[5]	typ	λ_d	N/A	527	nm
Peak Wavelength[5]	typ	λ_d	650	521	nm
Peak Wavelength range	typ	λ	645-655	510-530	nm
FWHM[5]	typ		20	35	nm
Forward Voltage	min	$V_{F\,min}$	2.1	2.3	V
	typ	V_F	2.3	3.1	V
	max	$V_{F\,max}$	3.0	4.5	V

Absolute Maximum Ratings

	Symbol	Deep Red	Green	Unit
Absolute Maximum Current (Pulsed)[6]		10	10	A
Absolute Maximum Current (CW)[6]		12	12	A
Absolute Maximum Junction Temperature[6,7]	T_{jmax}	110	150	°C
Storage Temperature Range		-40/+100	-40/+100	°C

Note 1: Data verified using NIST traceable calibration standard.

Note 2: All data are based on test conditions with a constant heat sink temperature T_{hs} = 40°C under pulse testing conditions. Pulse duration 20 msec, single pulse.

Note 3: Listed drive conditions are typical for common applications. Drive current and duty cycle should be adjusted as necessary to maintain the junction temperature desired to meet application lifetime requirement.

Note 4: Unless otherwise noted, values listed are typical. Devices are production tested and specified at 7.5 A.

Note 5: Typical values for information only.

Note 6: Product performance and lifetime data is specified at recommended forward drive currents. Sustained operation at or near absolute minimum or maximum currents may result in reduced device performance or lifetime compared to operation at recommended foward currents.

Note 7: Sustained operation at or above Maximum Operating Junction Temperature (T_{jmax}) will result in reduced device life time.

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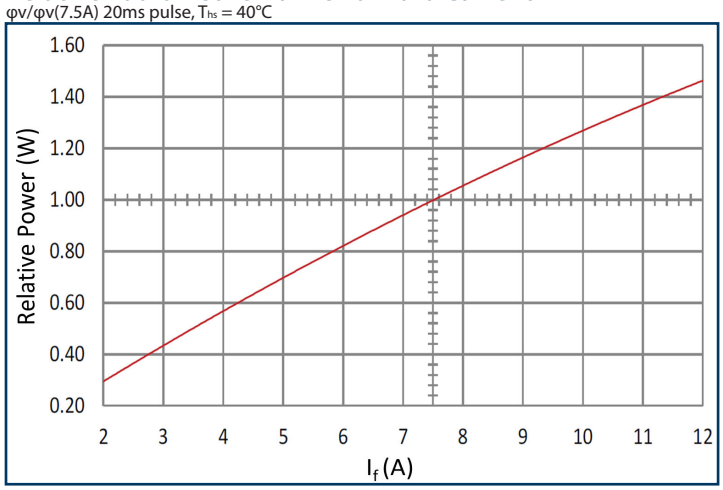
Optical & Electrical Characteristics - Deep Red

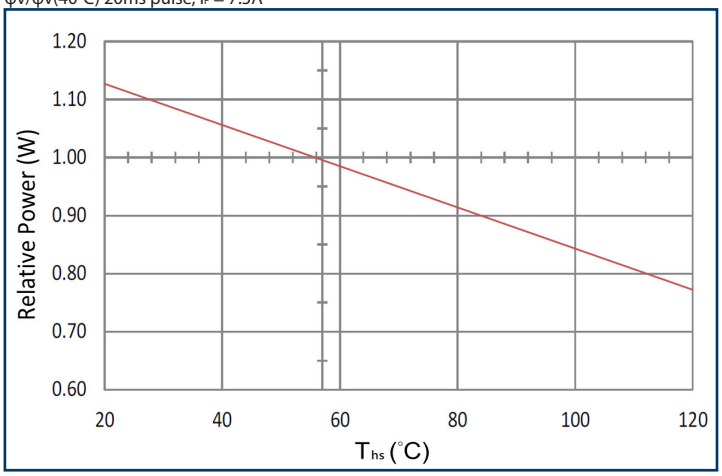
Relative Radiometric Flux vs Forward Current

φv/φv(7.5A) 20ms pulse, T_{hs} = 40°C



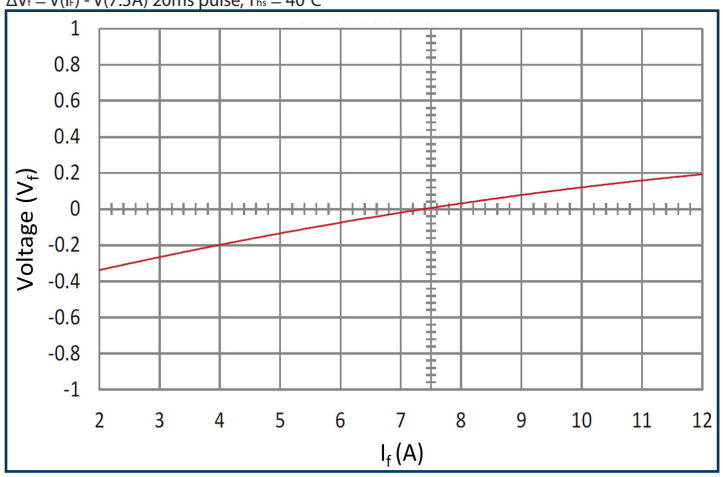
Relative Radiometric Flux vs Temperature

φv/φv(40°C) 20ms pulse, I_F = 7.5A



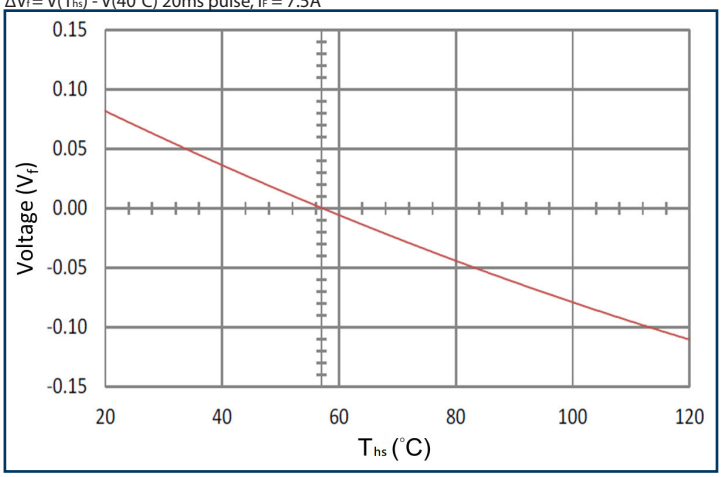
Forward Voltage vs Forward Current

$\Delta V_f = V(I_F)$ - V(7.5A) 20ms pulse, T_{hs} = 40°C



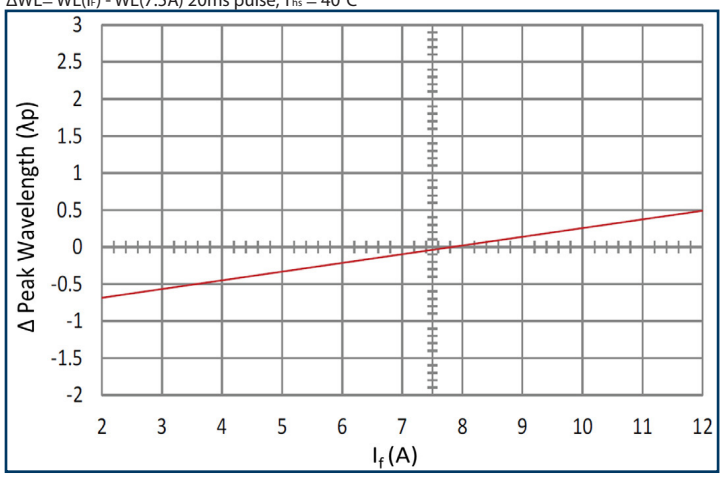
Forward Voltage vs Temperature

$\Delta V_f = V(T_{hs})$ - V(40°C) 20ms pulse, I_F = 7.5A



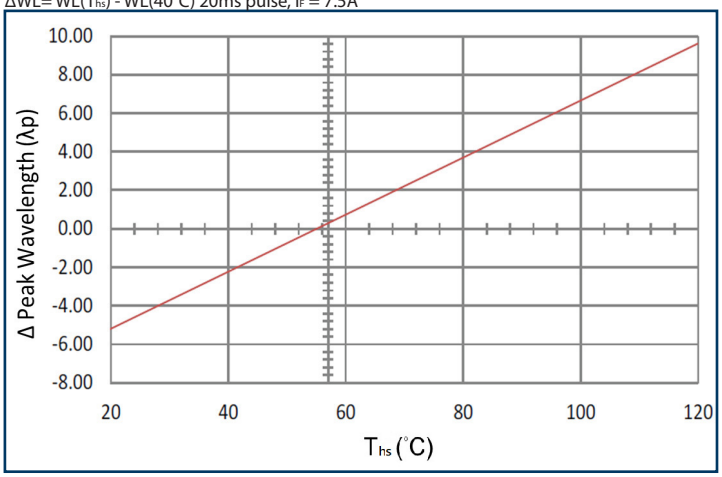
Peak Wavelength Shift vs Forward Current

$\Delta WL = WL(I_F)$ - WL(7.5A) 20ms pulse, T_{hs} = 40°C



Peak Wavelength Shift vs Temperature

$\Delta WL = WL(T_{hs})$ - WL(40°C) 20ms pulse, I_F = 7.5A



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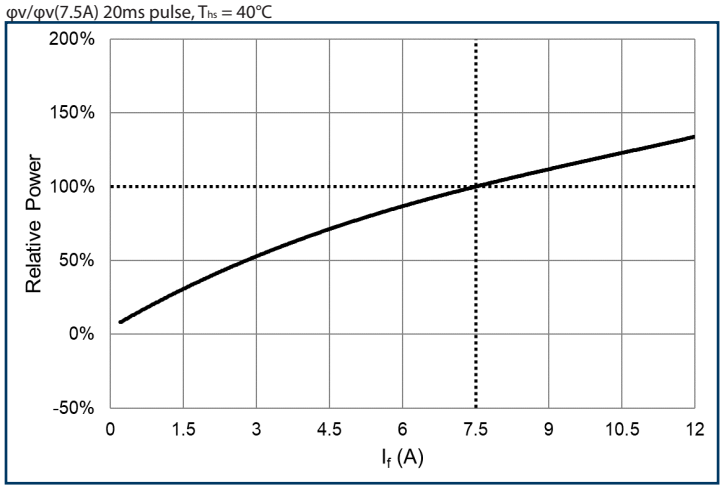
Optical & Electrical Characteristics - Green

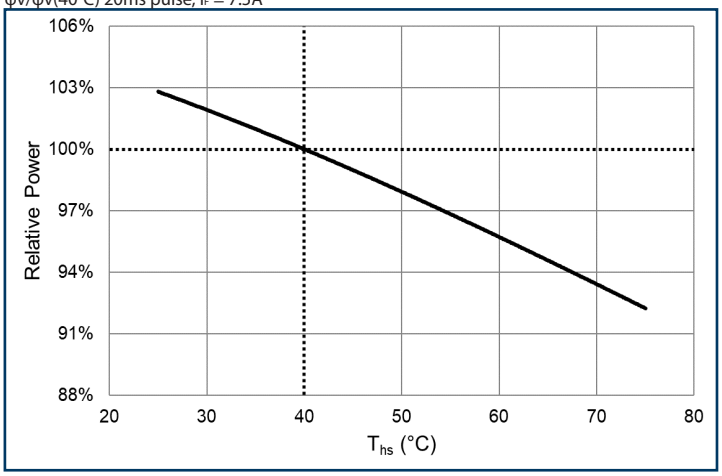
Relative Radiometric Flux vs Forward Current

φv/φv(7.5A) 20ms pulse, T_{hs} = 40°C



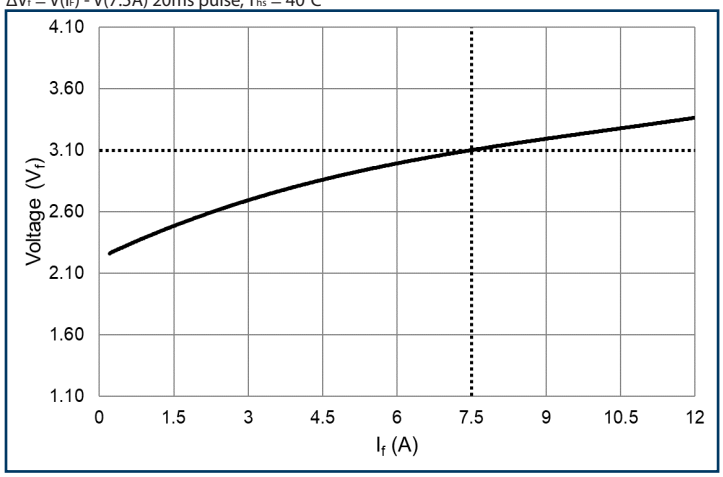
Relative Radiometric Flux vs Temperature

φv/φv(40°C) 20ms pulse, I_F = 7.5A



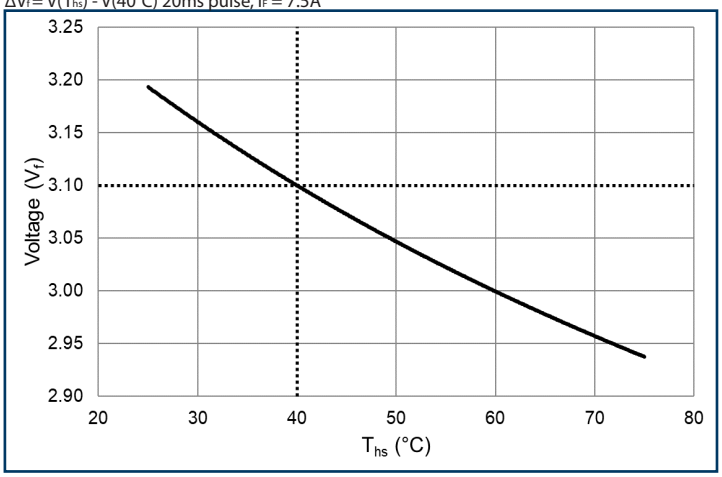
Forward Voltage vs Forward Current

$\Delta V_f = V(I_F)$ - V(7.5A) 20ms pulse, T_{hs} = 40°C



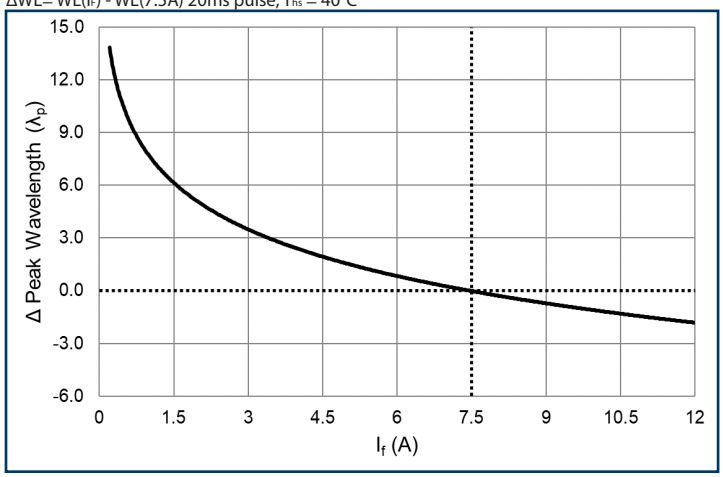
Forward Voltage vs Temperature

$\Delta V_f = V(T_{hs})$ - V(40°C) 20ms pulse, I_F = 7.5A



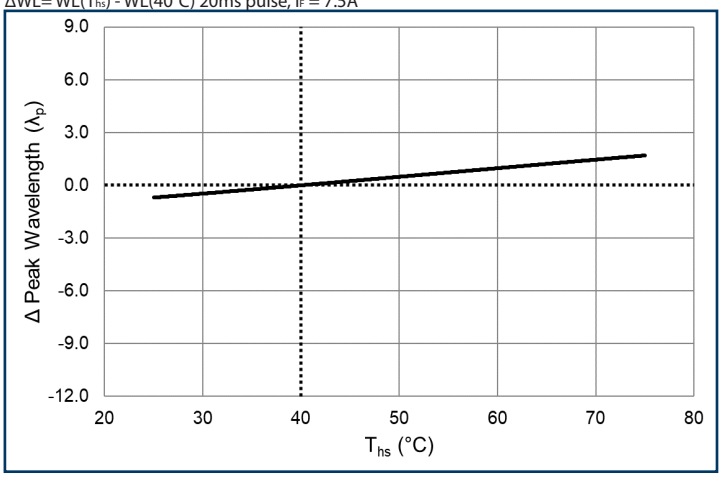
Peak Wavelength Shift vs Forward Current

$\Delta WL = WL(I_F)$ - WL(7.5A) 20ms pulse, T_{hs} = 40°C



Peak Wavelength Shift vs Temperature

$\Delta WL = WL(T_{hs})$ - WL(40°C) 20ms pulse, I_F = 7.5A



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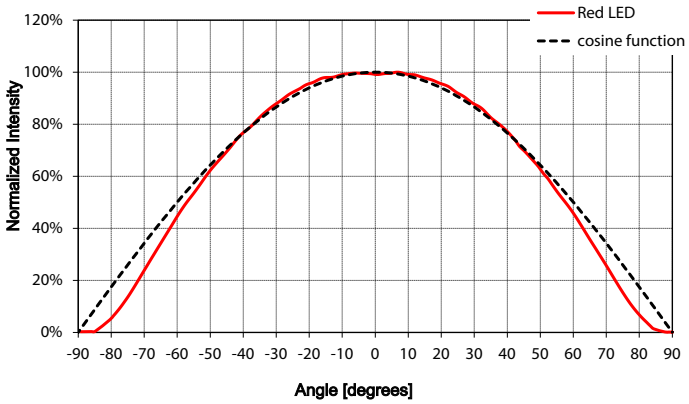
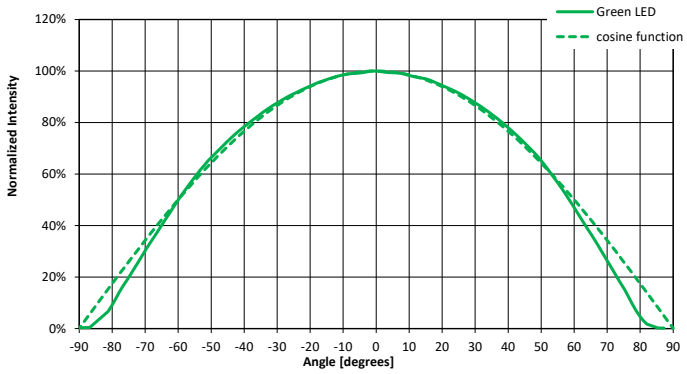
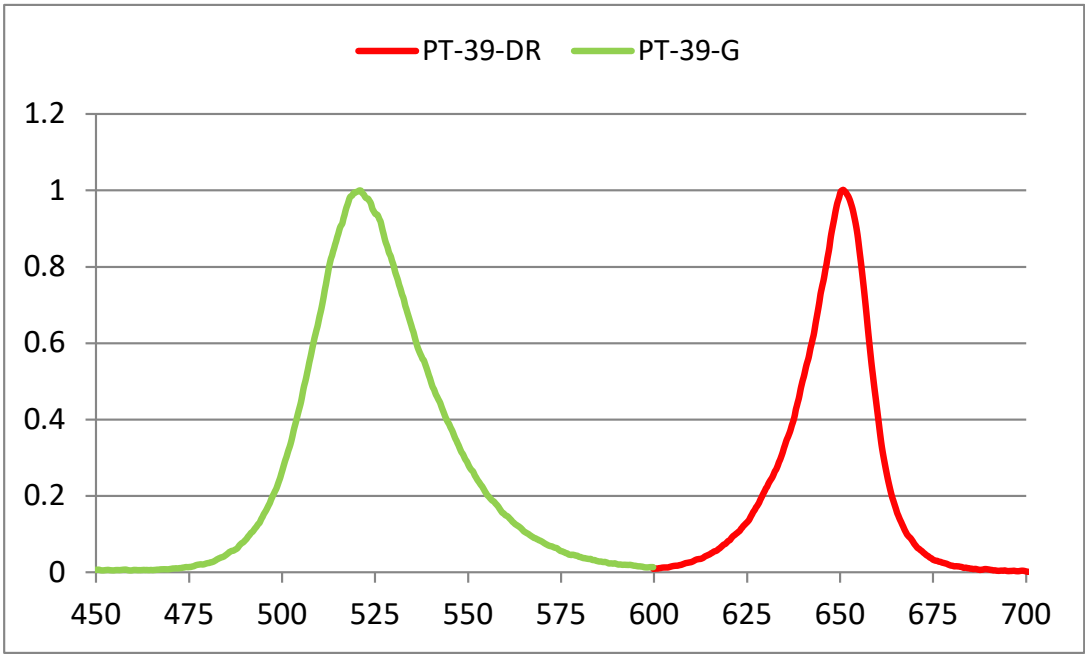
Angular Intensity Distribution (Typical)





Typical Spectrum



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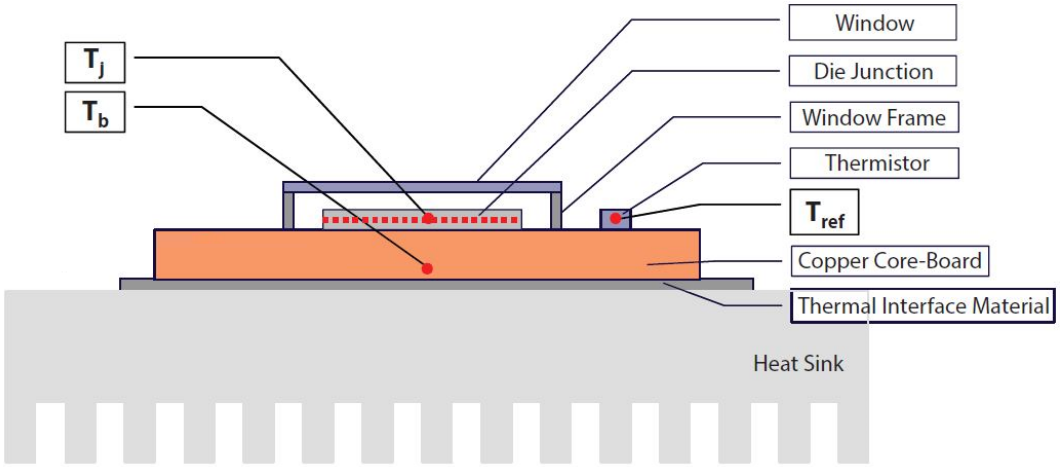
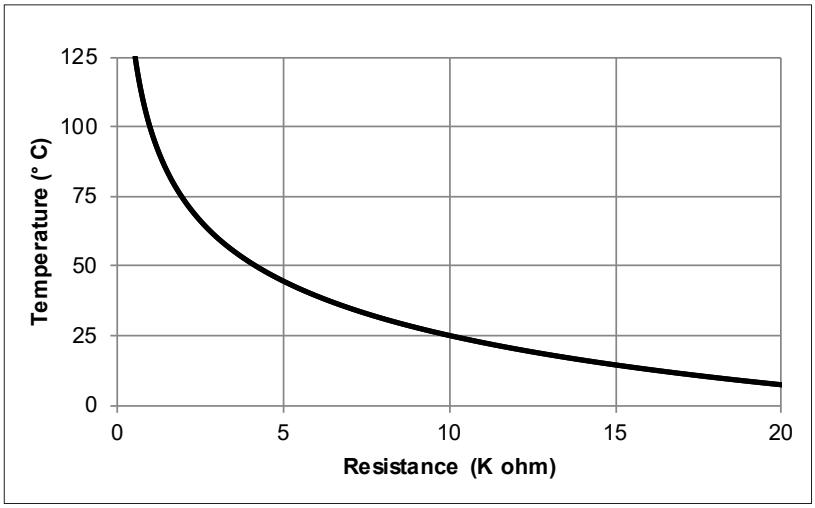
Thermal Resistance



Typical Thermal Resistance

$R_{\theta j\text{-}b}$	1.0 °C/W
$R_{\theta j\text{-}hs}$	1.2 °C/W

Thermal Information



For more about calculating thermistor temperature, please see https://luminusdevices.zendesk.com/hc/en-us/articles/4412023747341-How-do-I-determine-the-temperature-from-Luminus-on-board-Thermistor-

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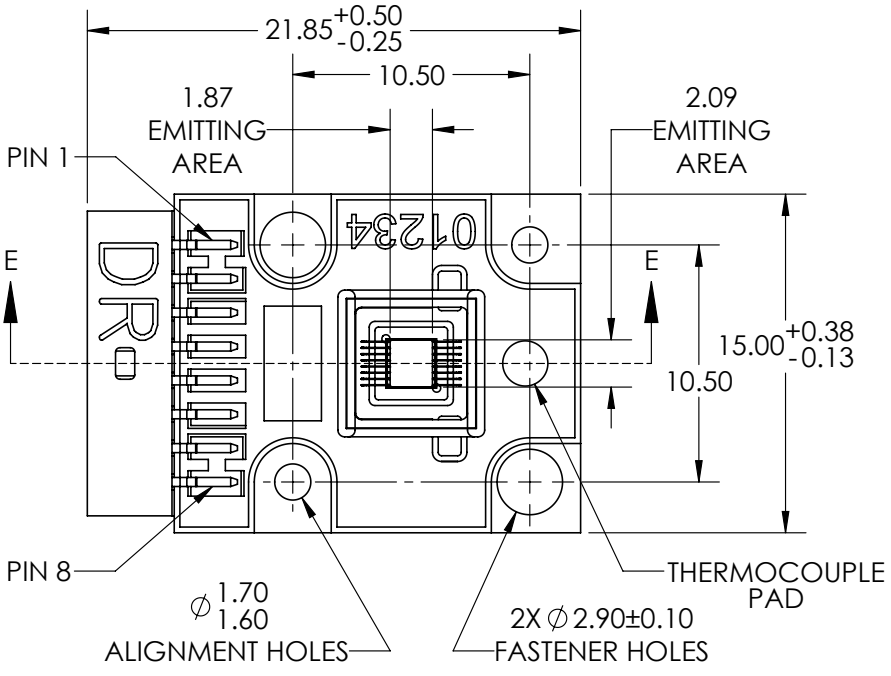
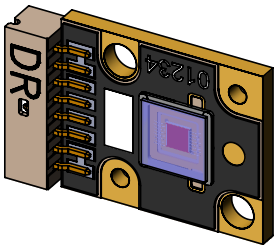
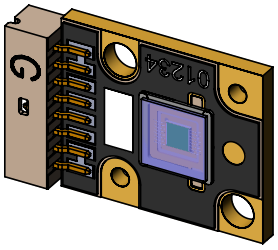
Mechanical Dimensions

DIMENSIONS IN MILLIMETERS

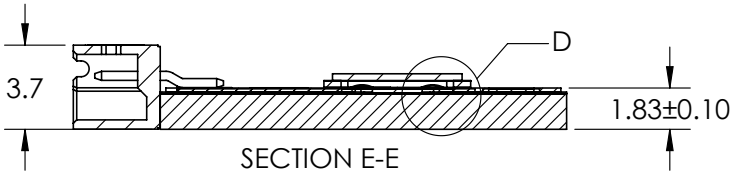




DEEP RED LED DEVICE

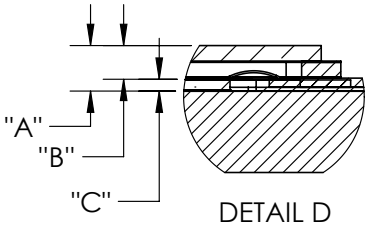


GREEN LED DEVICE



SECTION E-E

PIN ASSIGNMENTS		
LED COLOR	CATHODE (-)	ANODE (+)
DEEP RED	3,4,5,6	1,2,7,8
GREEN		



DETAIL D

DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	TOP OF METAL SUBSTRATE TO TOP OF WINDOW	0.88	±0.13
"B"	TOP OF DIE EMITTING AREA TO TOP OF WINDOW	0.65	±0.11
"C"	TOP OF METAL SUBSTRATE TO TOP OF DIE EMITTING AREA	0.23	±0.02

Note 1: For detailed drawing, please refer to DWG-002140 document

Note 2: Deep Red and Green PT-39-L51, Big Chip LEDs are individually assembled into a common anode copper coreboard with a footprint of 21.85mm x 15 mm.

Note 3: PT-39-L51 Mating Connector Cable Assembly ordering part number (for evaluation purposes only): 960041

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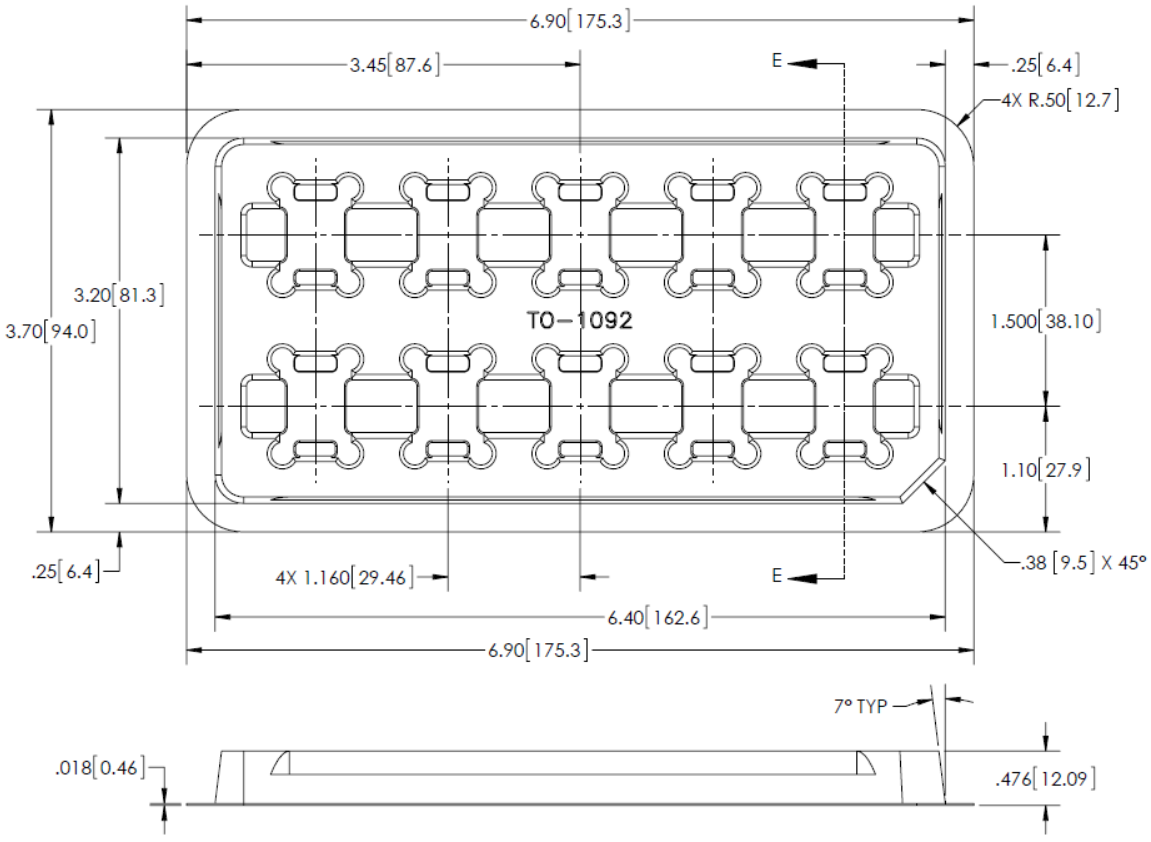
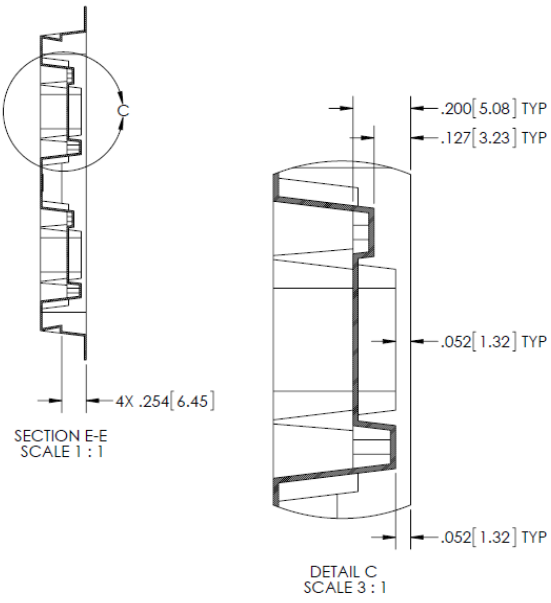
Shipping Tray Outline





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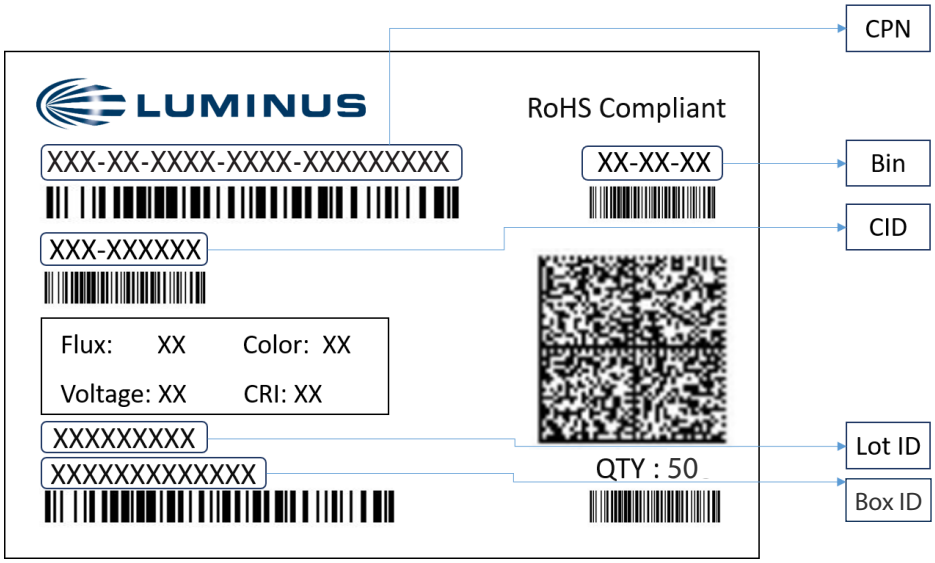
Shipping Label



Label Fields:

- CPN: Luminus ordering part number
- CID: Customer's part number
- QTY: Quantity of devices in pack
- Flux: Bin as defined on page 4
- Voltage: NA
- Color: Bin as defined on page 4
- CRI: NA

Packing Configuration:

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

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Revision History

Rev	Date	Description of Change
01	04/25/2016	Initial Release
02	04/13/2017	Updated max Vf specification from 5.0 to 5.5V and typical from 4.0 to 5.0V. Added min forward current = 200 mA.
03	12/08/2020	Updated parametric data and added higher flux bins for green
04	07/26/2022	Add ESD information in technology overview, add ordering information, shipping information & revision history chapter. Update characteristic curves and other editorial changes.

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This product is protected by U.S. Patents 6,831,302; 7,074,631; 7,083,993; 7,084,434; 7,098,589; 7,105,861; 7,138,666; 7,166,870; 7,166,871; 7,170,100; 7,196,354; 7,211,831; 7,262,550; 7,274,043; 7,301,271; 7,341,880; 7,344,903; 7,345,416; 7,348,603; 7,388,233; 7,391,059 Patents Pending in the U.S. and other countries.

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