Kyocera SLD Laser

LaserLight White & Infrared Dual Channel SMD

Technical Documentation

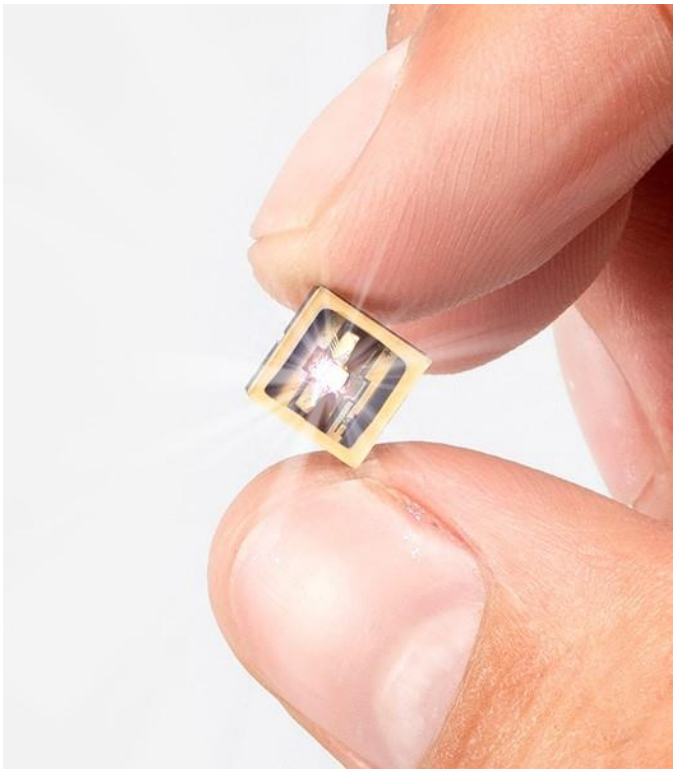


Table of Contents

General Introduction – LaserLight SMD

LaserLight SMD W-IR by SLD Laser is the world's first switchable, dual channel, high luminance, white laser light combined with Infrared emission. Featuring 450 lumens, 1300 Mcd/m2 and 200mW IR in a compact 7mm SMD, LaserLight SMD enables ultra-long throw distance and small optic sizes for specialty lighting applications. With reflective phosphor and diffuse, incoherent light emission in white and IR, LaserLight SMD is safe to use in all lighting applications.

FEATURES & BENEFITS

- World's highest luminance 1300 Mcd/m^2
- Infrared emission (switchable)
- Enables less than 2 degree beam angle from 35mm optic
- Stable efficacy vs. drive power
- Compact 7mm SMD with built-in safety features

LIGHTING APPLICATIONS

- Lighting & Infrared Illumination
- Outdoor & Portable
- Automotive
- Search & Rescue, Security

Part Numbers & Nomenclature

Part Number	Part Description
910-00014-WF	LaserLight SMD, 500lm White, 250 mW 850nm IR, Dual Channel in Waffle Pack
910-00014-TR	LaserLight SMD, 500lm White, 250 mW 850nm IR, Dual Channel in Tape and Reel
910-00015-IT	LaserLight SMD, 500lm White, 250 mW 850nm IR, on Star MCPCB

Photometric Characteristics White*

Parameter	unit	Minimum value	Typical value	Maximum Value
Luminous Flux	lm	400	500	600
Luminous Intensity	cd	127	159	191
Peak Luminance	cd/mm^2		1300	
Spot size x (FWHM)	mm		0.25	
Spot size y (FWHM)	mm		0.45	
Viewing Angle	degrees		120	
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in X direction	mm	-0.200		0.200
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in Y direction	mm	-0.200		0.200
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in Z direction	mm	-0.100		0.100
Correlated Color Temperature**	K	5310	6000	7040
Color Rendering Index (CRI)			70	

* Photometric characteristics are described at I_f = 2.6A and T_{case} = 50°C unless otherwise specified.
** See Color Bin Structure for additional information

Operating Limits, Electrical Characteristics, and Thermal Characteristics White*

Parameter	unit	Minimum value	Typical value	Maximum Value
Forward Current (I_f), DC	A	0.5**	2.3	2.3
Forward Current (I_f), Pulsed peak current	A			1.3
Maximum reverse current	A			0
Operating Voltage	V		5	
Thermal (heat) dissipated power	W		10	

Maximum operating temperature				***
ESD Resistance (HBM Level 1)			2kV	
Pulse Rise and Fall Time	ns		0.5	

* Operating limits, electrical characteristics, and thermal characteristics are described at I_f = 2.3A and T_{case} = 50°C unless otherwise specified.
**Below the laser threshold current (about I_f = 500mA at T_{case}=50°C) the luminous flux will go towards zero.
***See derating curve (Figure 22)

Photometric Characteristics Infrared*

Parameter	unit	Minimum value	Typical value	Maximum Value
Radiant Flux	mW	250		
Spot size x (FWHM)	mm		0.25	
Spot size y (FWHM)	mm		0.45	
Viewing Angle	degrees		120	
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in X direction	mm	-0.200		0.200
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in Y direction	mm	-0.200		0.200
Position Tolerance of Emission Spot Center (Peak Luminance Maximum) in Z direction	mm	-0.100		0.100
Peak Wavelenth**	nm	837	850	863

* Photometric characteristics are described at I_f = 1.0A and T_{case} = 50°C unless otherwise specified.
** Peak wavelength is specified at I_f = 1.0A and T_{case} = 25°C

Operating Limits, Electrical Characteristics, and Thermal Characteristics Infrared*

Parameter	unit	Minimum value	Typical value	Maximum Value
Forward Current (I_f), DC	A	**	1.0	1.0

Forward Current (I_f), Pulsed peak current	A			1.0
Maximum reverse current	A			0
Operating Voltage	V		1.8	
Thermal (heat) dissipated power	W		1.25	
Maximum operating temperature				***
ESD Resistance (HBM Level 1)			2kV	

* Operating limits, electrical characteristics, and thermal characteristics are described at I_f = 1.65A and T_{case} = 50°C unless otherwise specified.
**Below the laser threshold current (about I_f = 500mA at T_{case}=50°C) the luminous flux will go towards zero.
***See derating curve (Figure 23)

Table 1: Color binning structure*
(I_f = 1.65A, T_{case} = 50°C)

Nominal CCT, K	x	y	Bin Code
6500	0.3381	0.3762	A
	0.3005	0.3415	
	0.3068	0.3113	
	0.3366	0.3369	

*Kyocera SLD Laser maintains tolerance of ±0.005 in Ccx and Ccy.

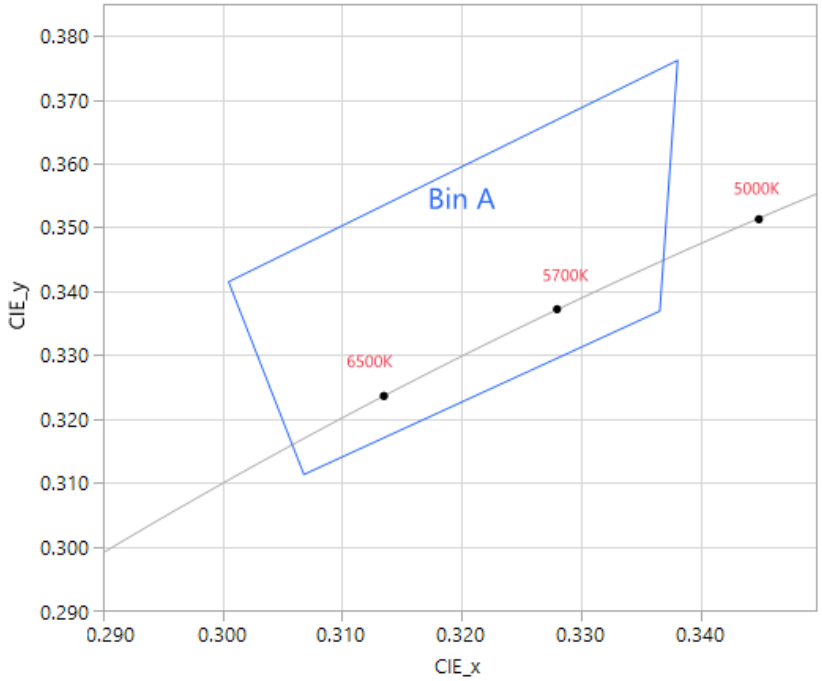


Figure 01: Chromaticity bin plotted with Black Body curve

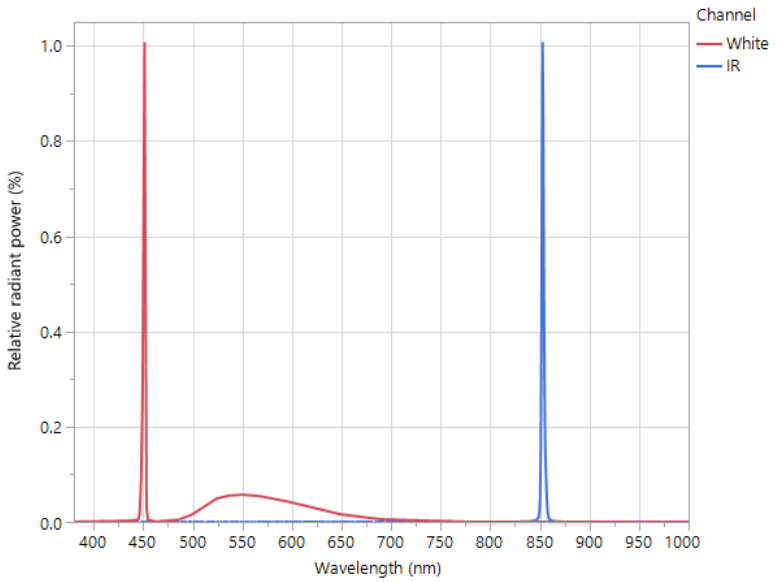


Figure 02: Typical spectral power distribution of 6500K component with 850nm IR channel
(White channel measured at I_f = 2.3A, T_{case} = 50°C and IR channel measured at I_f = 1.0A, T_{case} = 50°C)

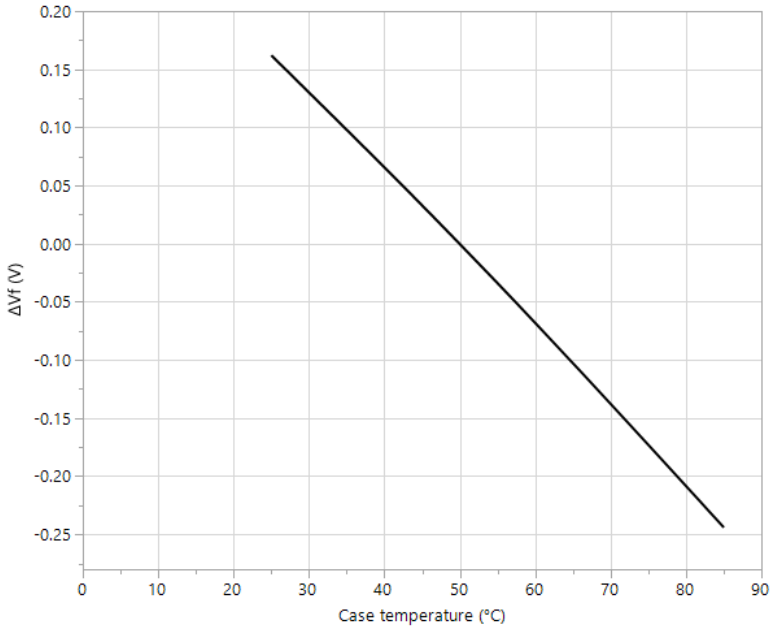


Figure 03: White channel: change in forward voltage vs temperature
(Measured at I_f = 2.3A and normalized at T_{case} = 50°C)

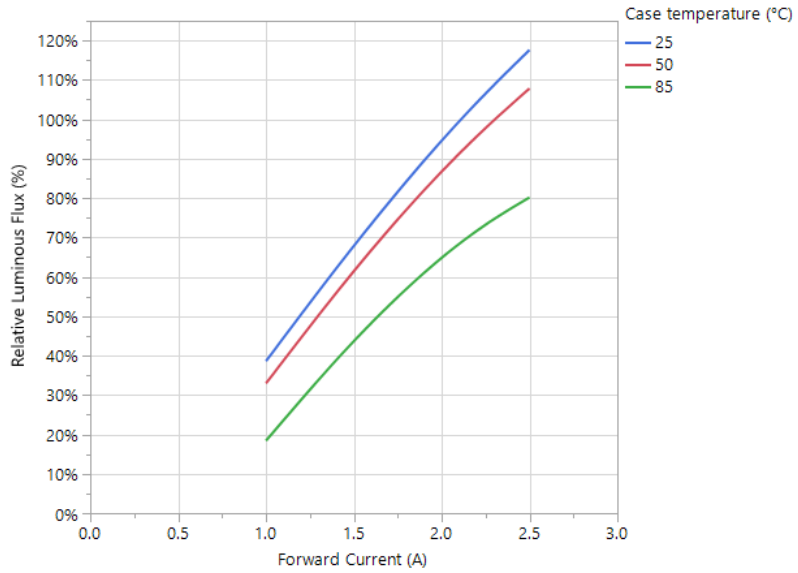


Figure 04: White channel: relative luminous flux vs current
(Normalized luminous flux at I_f = 2.3A and at T_{case} = 50°C)

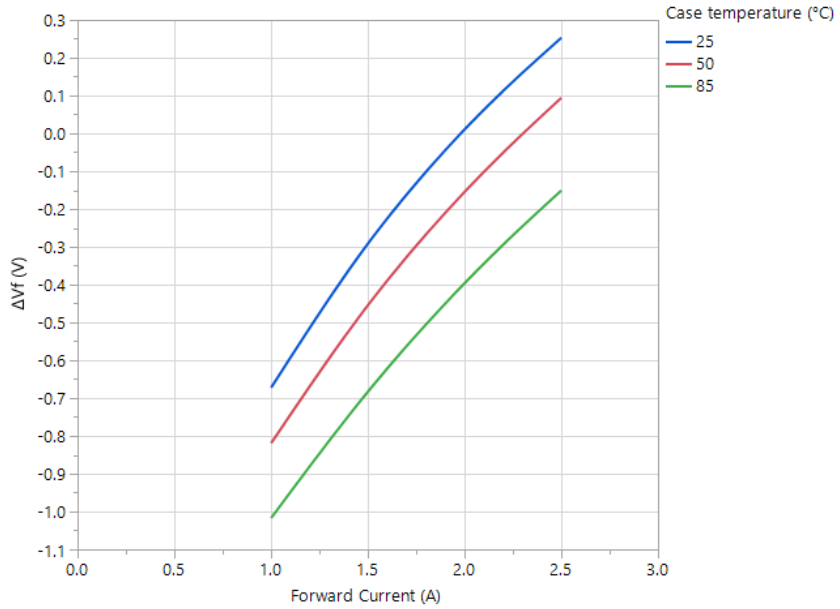


Figure 05: White channel: change in forward voltage vs forward current
(Normalized to at I_f = 2.3A and T_{case} = 50°C)

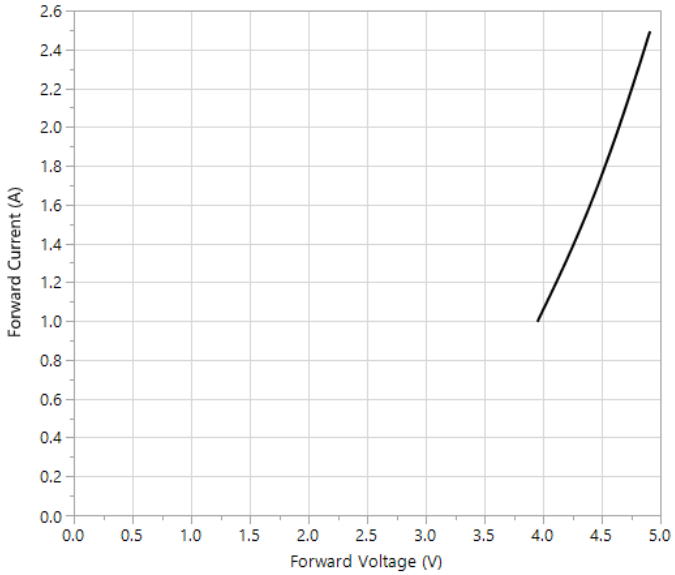


Figure 06: White channel: forward current vs forward voltage
(Measured at T_{case} = 50°C)

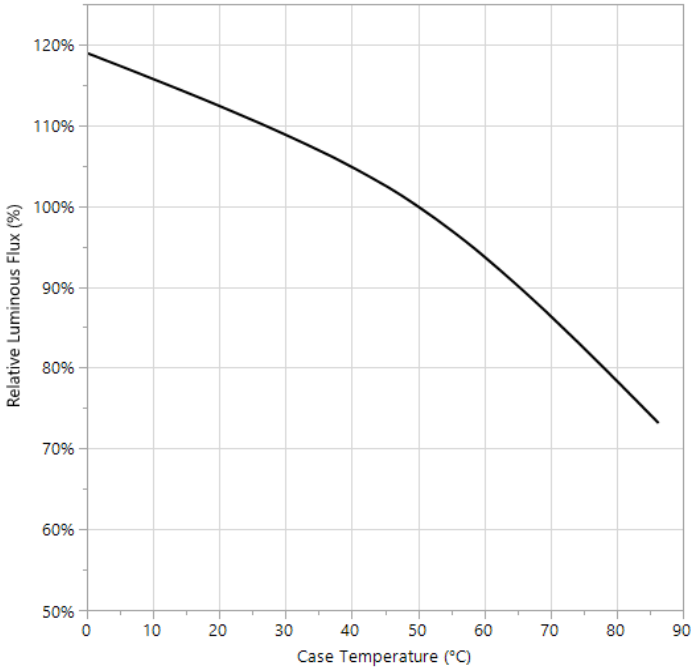


Figure 07: White channel: relative luminous flux vs case temperature
(Normalized luminous flux at I_f = 2.3A and at T_{case} = 50°C)

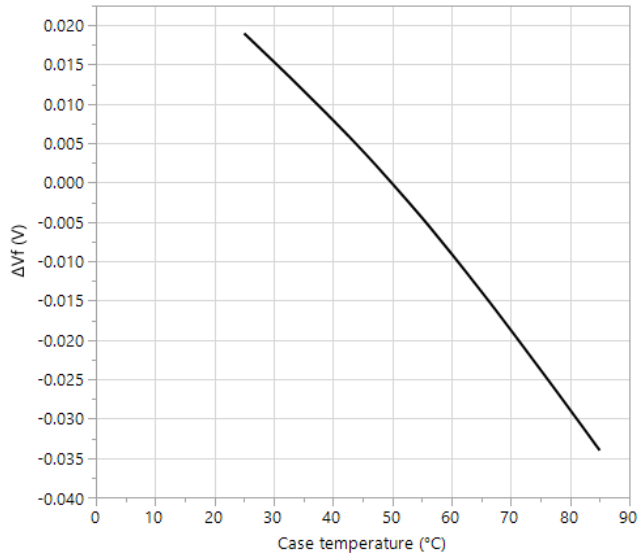


Figure 08: IR channel: change in forward voltage vs temperature
(Measured at I_f = 1.0A and normalized at T_{case} = 50°C)

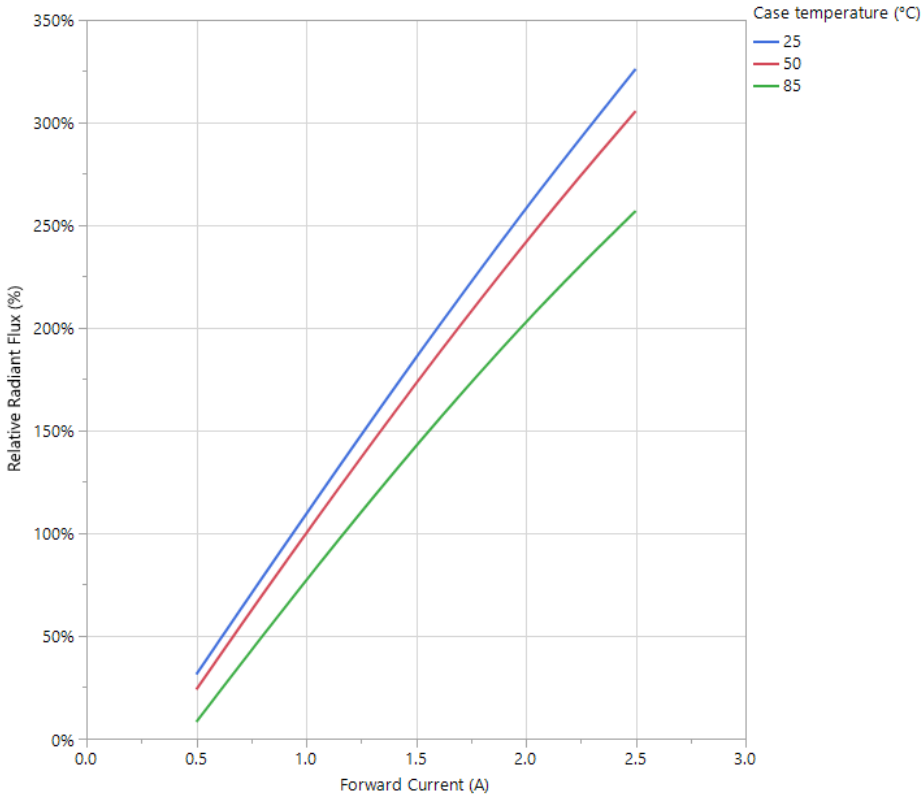


Figure 09: IR channel: relative radiant flux vs current
(Normalized luminous flux at I_f = 1.0A and at T_{case} = 50°C)

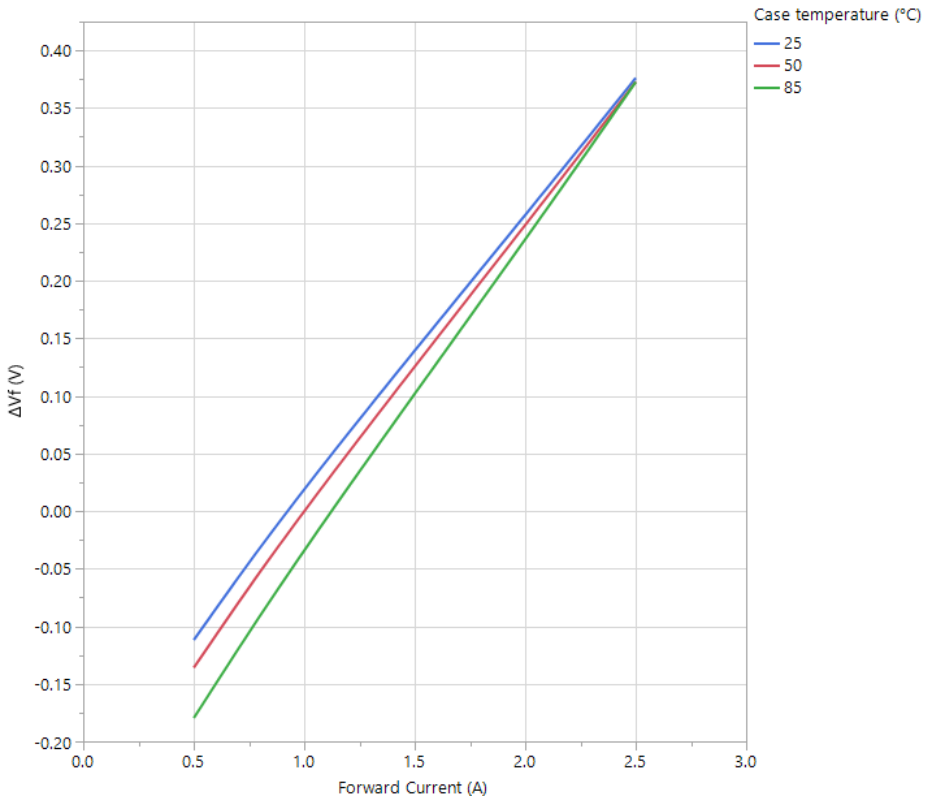


Figure 10: IR channel: change in forward voltage vs forward current (Normalized to at I_f = 1.0A and T_{case} = 50°C)

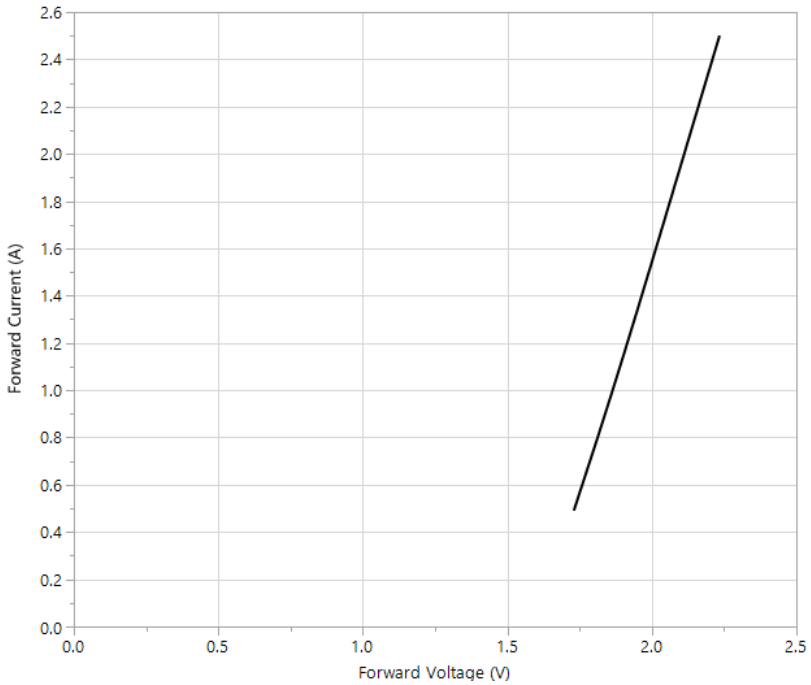


Figure 11: IR channel: forward current vs forward voltage (Measured at T_{case} = 50°C)

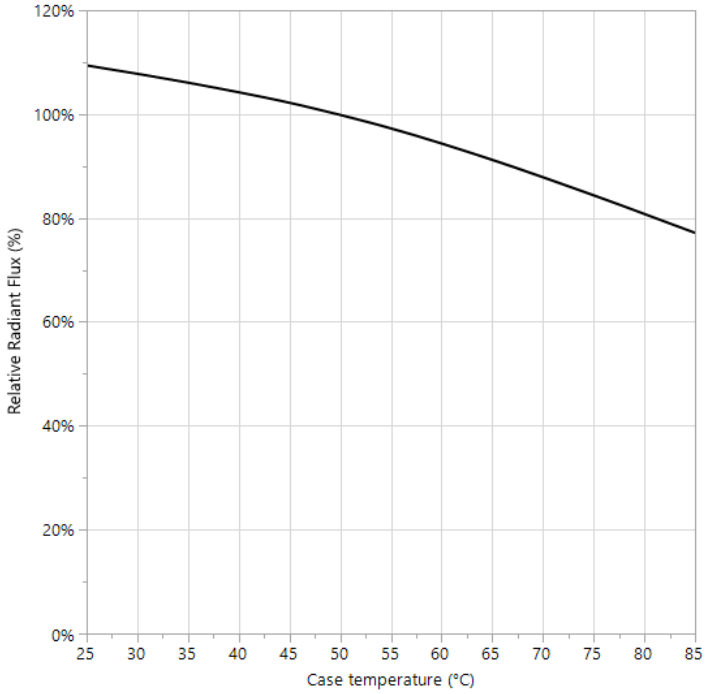


Figure 12: IR channel: relative radiant flux vs case temperature
(Normalized luminous flux at I_f = 1.0A and at T_{case} = 50°C)

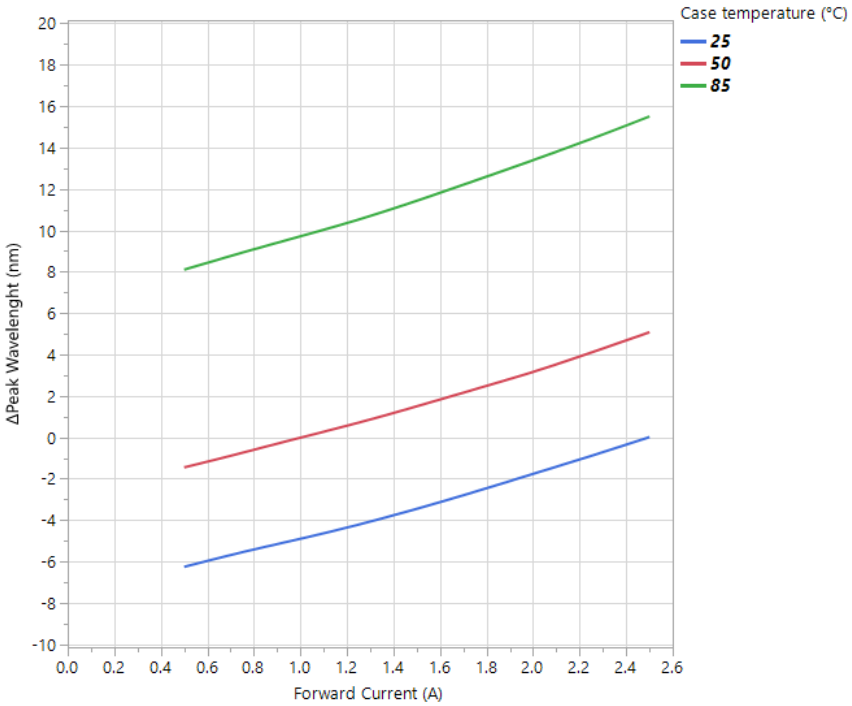


Figure 13: IR channel: Change in peak wavelength vs forward current
(Peak wavelength normalized at I_f = 1.0A and at T_{case} = 50°C)

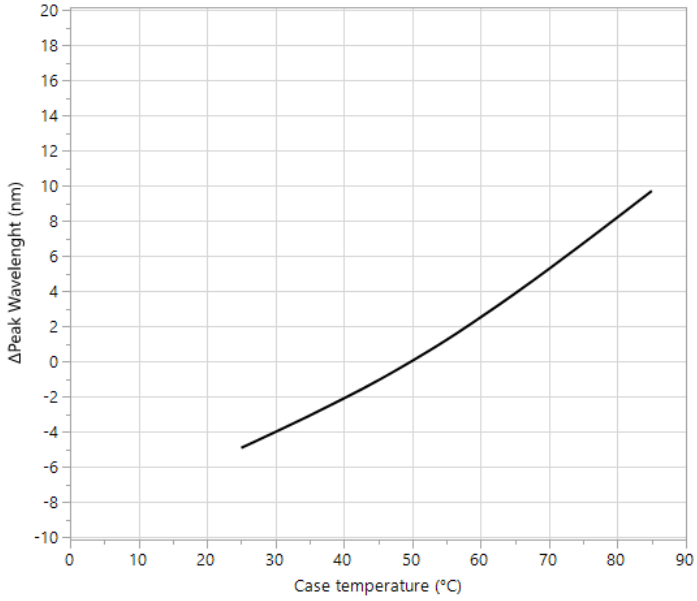
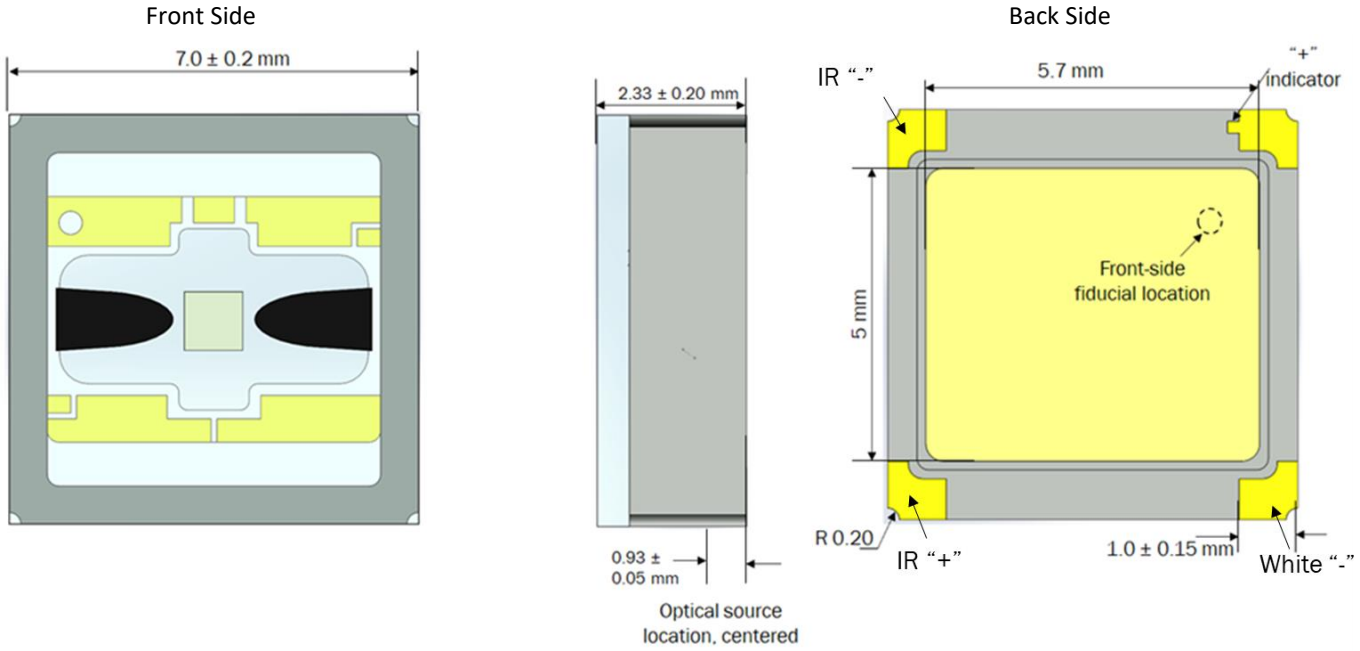


Figure 14: IR channel: Change in peak wavelength vs case temperature (Peak wavelength normalized at I_f = 1.0A and at T_{case} = 50°C)

LaserLight SMD Part Mechanical Layouts



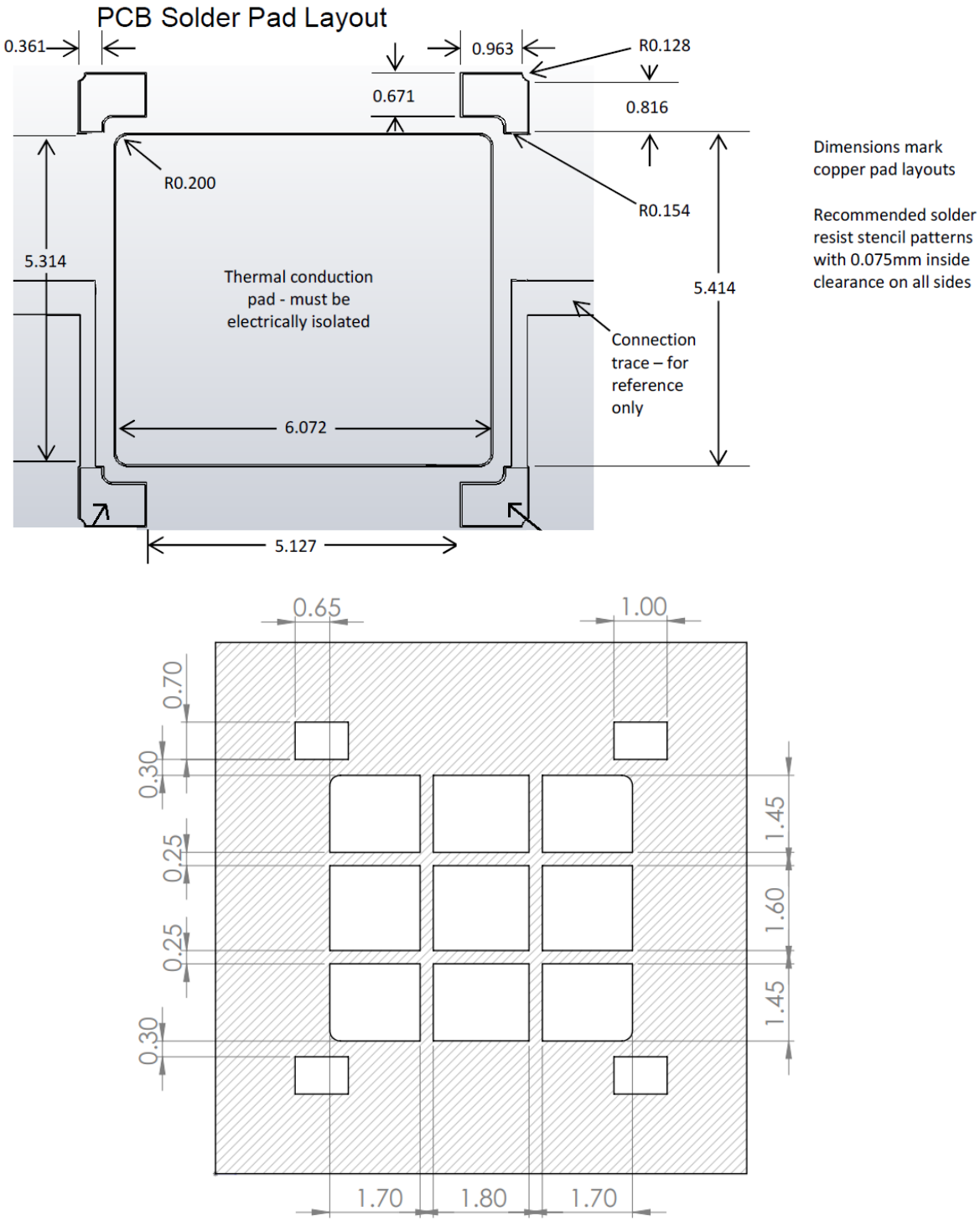
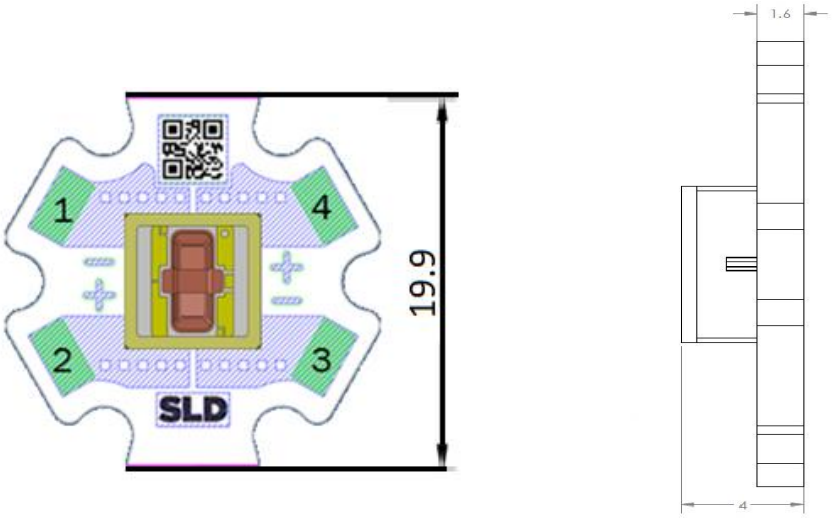


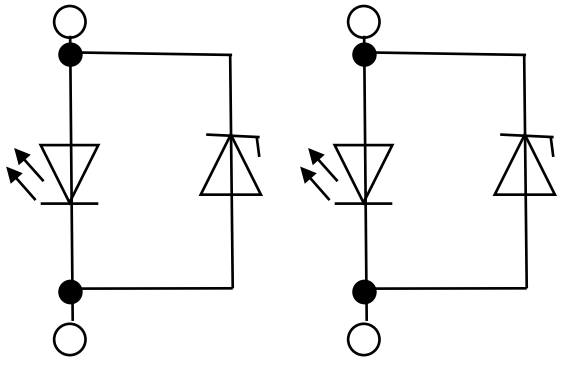
Figure 15: Recommended stencil mask design

Option for Star MCPCB Mounting



Contact position number	Function
1	White Cathode (Laser -)
2	IR Anode (Laser +)
3	IR Cathode (Laser -)
4	White Anode (Laser +)

Circuit Diagram



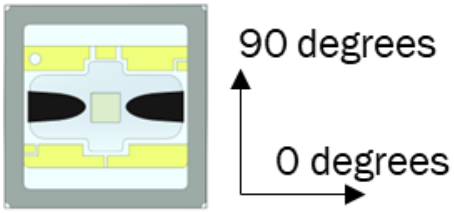


Figure 16: Orientation for near and far field plots

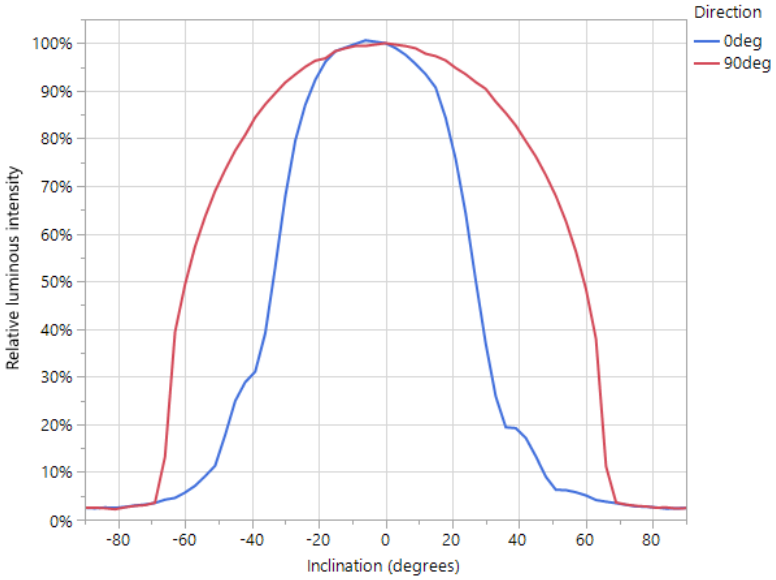


Figure 17: White channel: far field distribution
(Measured at I_f = 2.3A and at T_{case} = 50°C, normalized to 0,0 position)

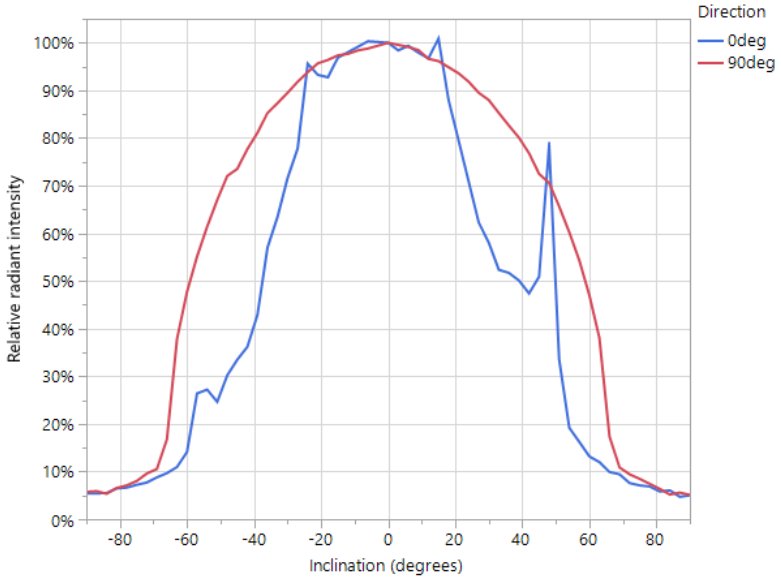


Figure 18: IR channel: far field distribution
(Measured at I_f = 1.0A and at T_{case} = 50°C, normalized to 0,0 position)

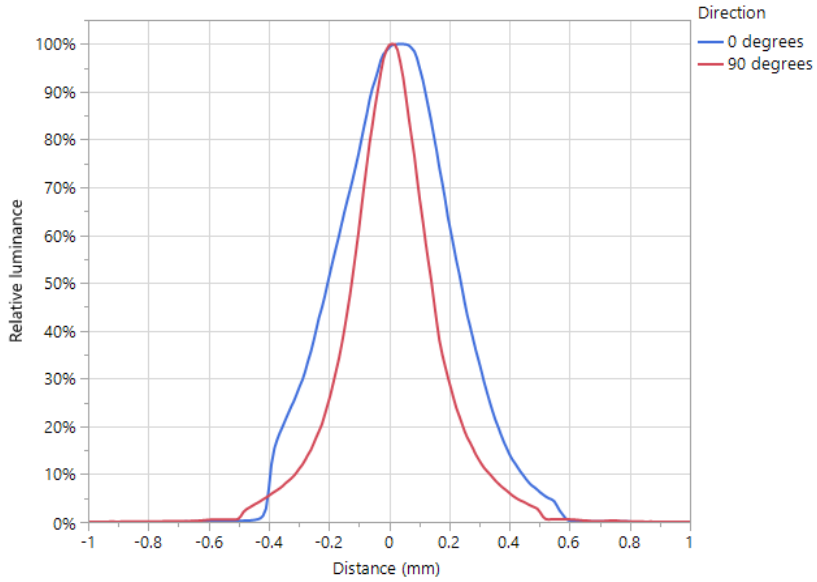


Figure 19: White channel: near field relative luminance
(Measured at I_f = 2.3A and at T_{case} = 50°C, normalized to 0,0 position)

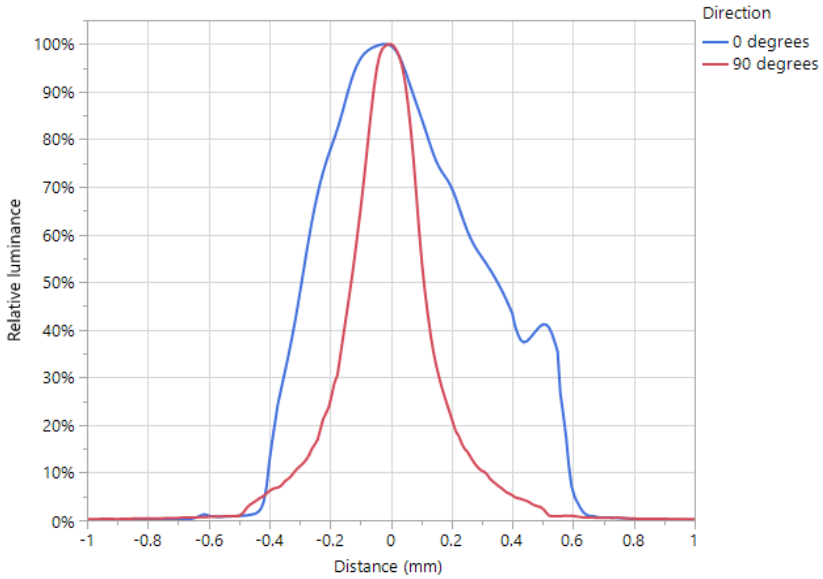


Figure 20: IR channel: near field relative luminance
(Measured at I_f = 1.0A and at T_{case} = 50°C, normalized to 0,0 position)

Ambient Conditions

a. Temperature

Attribute	unit	min	nom	max
Storage temperature (passive)	°C	-40		135

Life Time

Attribute	unit	nom
L70 continuous operation MTTF (mean time to failure)	hr	1,000

The above mentioned life time specification is fulfilled if the case temperature is maintained at 50°C at the case or lower or part is de-rated.

Case Temperature Description

The case temperature (T_{case}) is measured on the metal core printed circuit board (MCPCB) near the thermal solder pad of the component. To ensure accuracy of the case temperature reflecting stated performance good thermal contact between two interfaces: 1) the component and MCPCB and 2) the thermocouple or thermal measurement device and the MCPCB. See Figure 21 for recommended location of T_{case}.

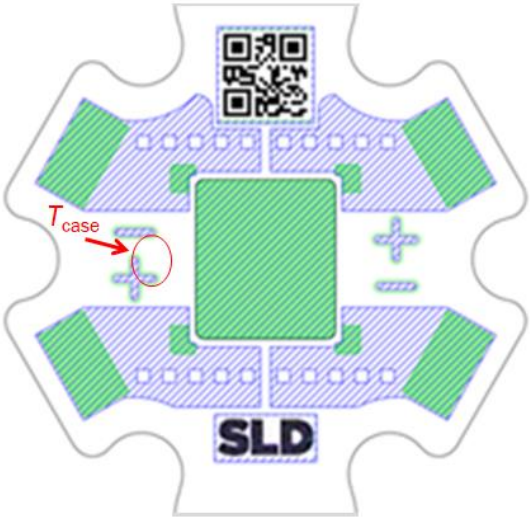


Figure 21: Recommended location of T_{case} measurement

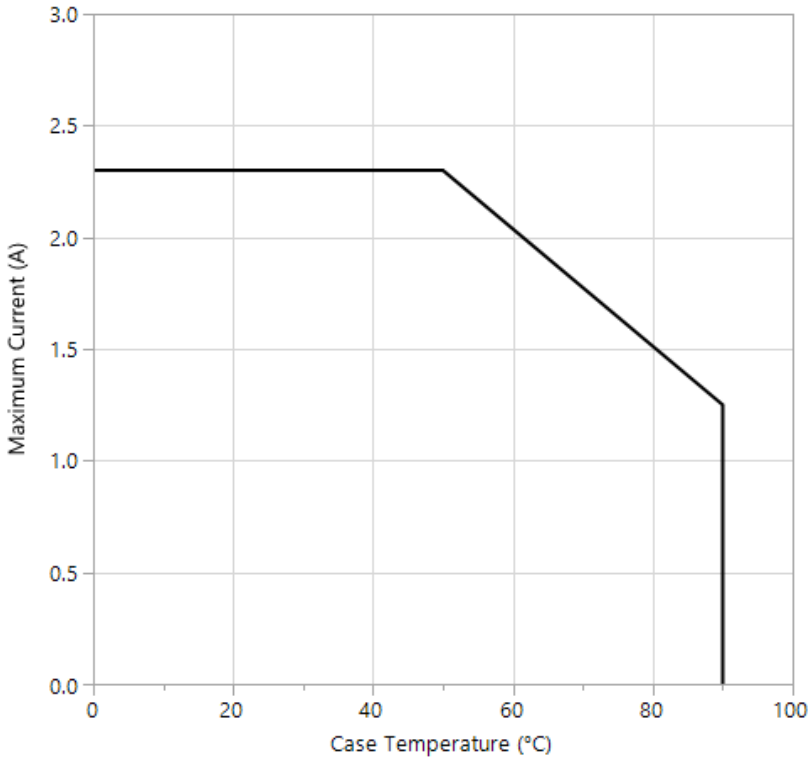


Figure 22: Derating curve for White channel

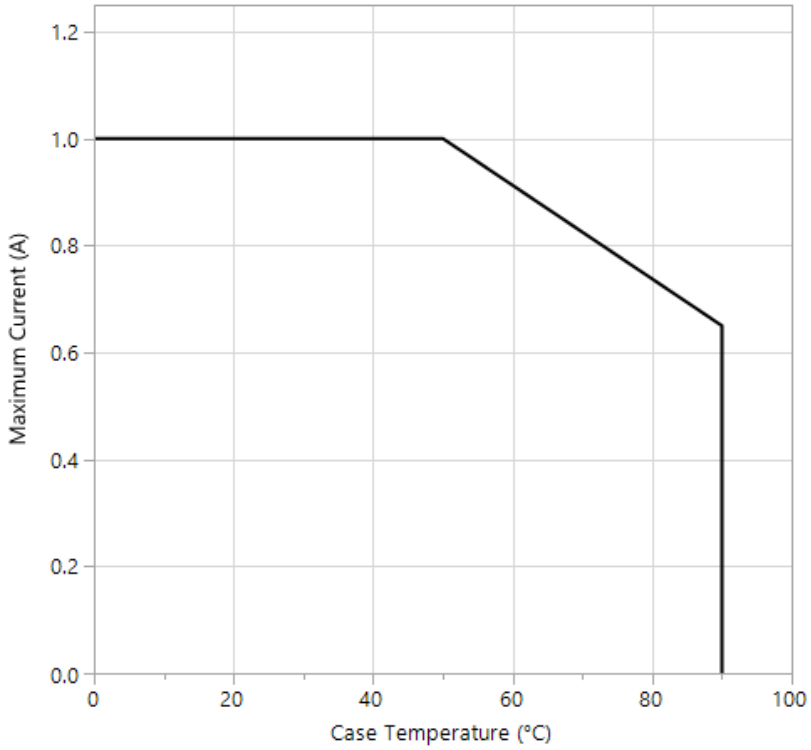
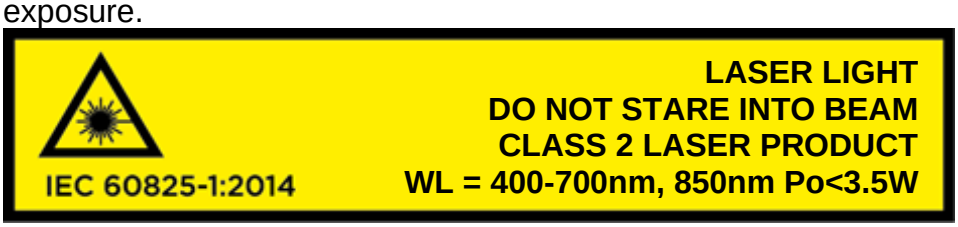


Figure 23: Derating curve for IR channel

Laser Safety Rating Information

LaserLight SMD white light has independent UL certification for the solid-state lighting safety standard ANSI/UL 8750.

The LaserLight SMD component is a “Class 2 Laser Product” under IEC 60825-1:2014 standard. Maximum output of laser light is 3.5mW and emitted wavelengths are 440-700nm and infrared wavelengths of 850nm. SMD is rated “Risk Group 2” for IEC 62471:2006 Photobiological safety of lamps and lamp systems, moderate risk. This means the system is safe for typical use as long as reasonable precautions are taken to avoid direct constant eye exposure to the illuminated portion of the device. The direct laser is sealed in its case and not visible. Only the diffuse converted white light from the phosphor is visible. Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



Informations sur la sécurité laser

LaserLight SMD dispose d'une certification UL indépendante pour la norme de sécurité d'éclairage à semi-conducteurs ANSI / UL 8750 pour les équipements à diodes électroluminescentes (LED) à utiliser dans l'éclairage.

Le produit LaserLight SMD est un «produit laser de classe 2» selon la norme CEI 60825-1: 2014. La puissance maximale de la lumière laser est de 3,5 mW et les longueurs d'onde émises sont de 440 à 700 nm et 850nm. SMD est classé «Groupe de risque 2» pour la CEI 62471: 2006 Sécurité photobiologique des lampes et des systèmes de lampes, risque modéré. Cela signifie que le système est sûr pour une utilisation typique tant que des précautions raisonnables sont prises pour éviter une exposition oculaire directe et constante à la partie éclairée de l'appareil. Le laser direct est scellé dans son boîtier et non visible. Seule la lumière blanche diffuse convertie du luminophore est visible. Attention - L'utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans ce document peuvent entraîner une exposition à des radiations dangereuses.

Handling Instructions

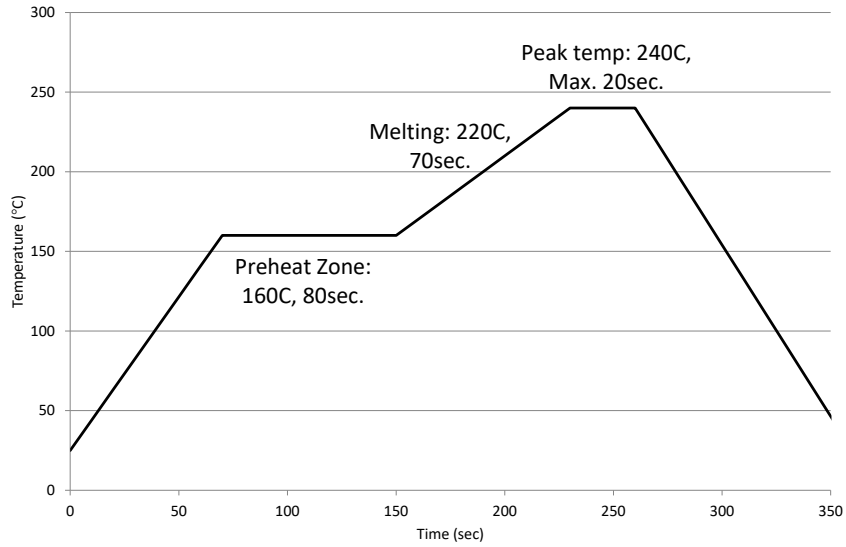
- Handle the component by its package only
- Never hold the component by the glass window
- This product is sensitive to electrostatic discharge (ESD) and should be handled at a static free workstation.

Take the following precautions to protect the component against ESD or electrical overdrive which can cause unexpected component failure:

- Power supply must be off when connected. Do not connect to live power.
- Power supply must not apply voltage surge or spike above max rating
- Power supply must be current limited with voltage maximum
- The user must be connected to the ground and use anti-static gloves.
- Use wrist straps in direct contact with skin.
- Use grounded work surfaces and semi-conductive anti-static table material.
- The user's feet must touch the floor.

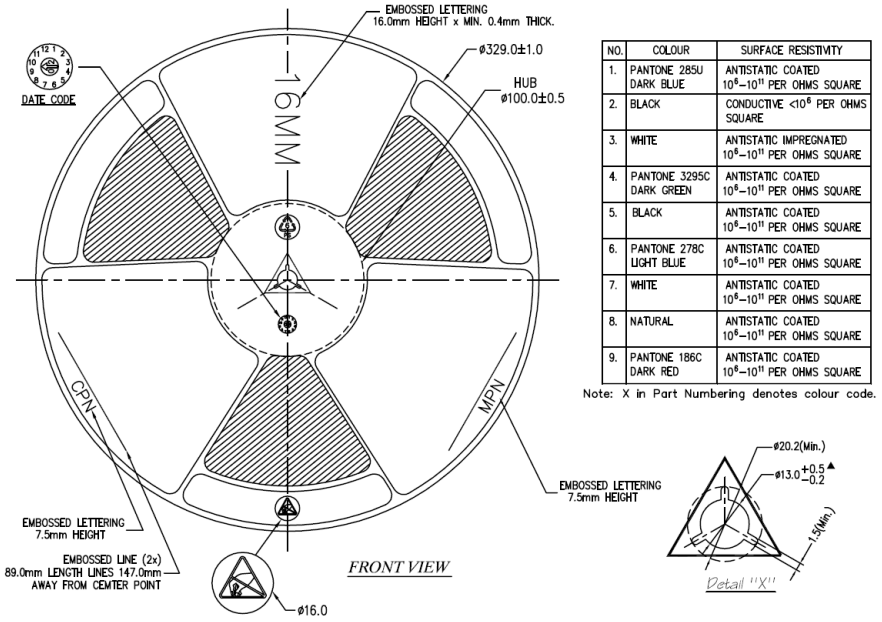
Soldering Conditions

Lead free Solder



Shipment Packaging and Container Information

Tape and Reel Diagram

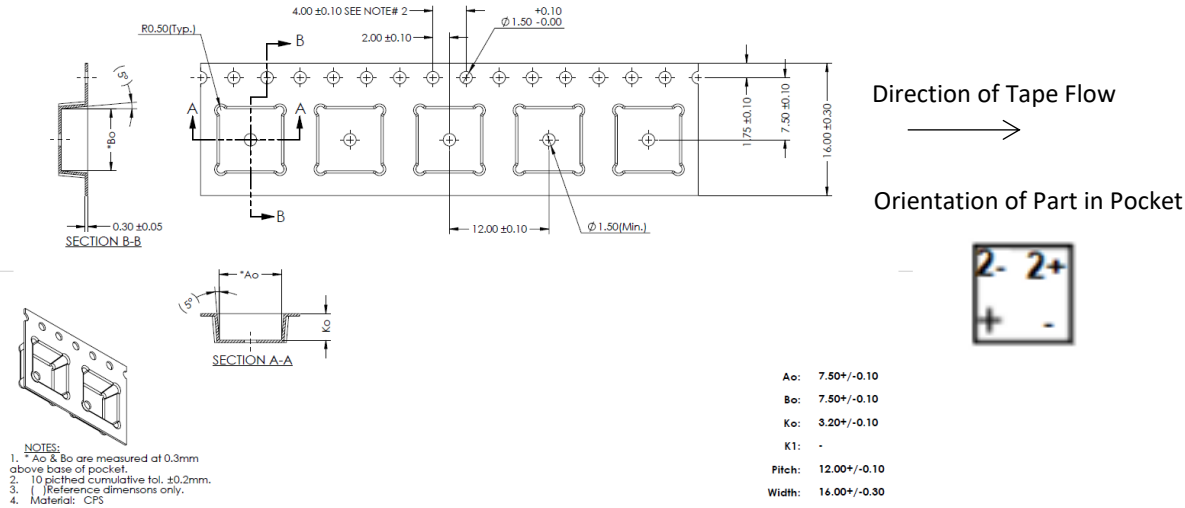


NO.	COLOUR	SURFACE RESISTIVITY
1.	PANTONE 285U DARK BLUE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
2.	BLACK	CONDUCTIVE <10^6 PER OHMS SQUARE
3.	WHITE	ANTISTATIC IMPREGNATED 10^6–10^{11} PER OHMS SQUARE
4.	PANTONE 3295C DARK GREEN	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
5.	BLACK	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
6.	PANTONE 278C LIGHT BLUE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
7.	WHITE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
8.	NATURAL	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
9.	PANTONE 186C DARK RED	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE

Note: X in Part Numbering denotes colour code.

Standard packaging increment (SPI) is 500 parts per reel

Pocket Carrier Tape Diagram

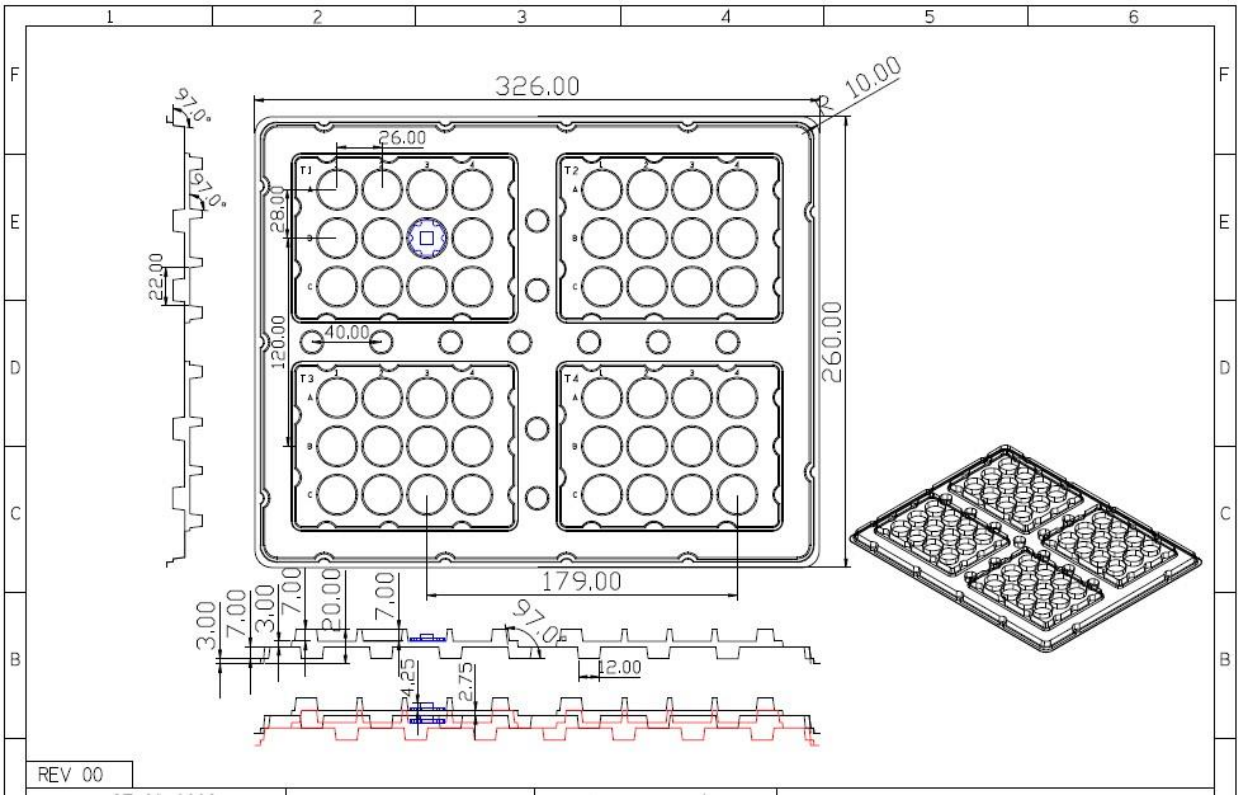


NOTES:
1. * Ao & Bo are measured at 0.3mm above base of pocket.
2. 10 pitched cumulative tol. ±0.2mm.
3. ( ) Reference dimensions only.
4. Material: CPS

Ao:	7.50+/-0.10
Bo:	7.50+/-0.10
Ko:	3.20+/-0.10
K1:	-
Pitch:	12.00+/-0.10
Width:	16.00+/-0.30

Reel and Box Label

Packaging Tray for MCPCB Mounted SMD
Standard packaging Increment (SPI): 48 parts per tray



Waffle Pak Packaging for SMD Components
Samples & Quantities 1-100 pieces

About Kyocera SLD Laser

KYOCERA SLD Laser, Inc. (KSLD) is a wholly owned subsidiary and group company of KYOCERA Corporation, commercializing a new generation of gallium nitride based laser light sources for automotive, mobility, specialty lighting, and consumer applications. The company is ISO 9001 certified and automotive compliant to IATF 16949, and operates facilities in Santa Barbara, CA and in Fremont, CA. KSLD's high luminance LaserLight™ sources are UL and IEC safety certified and are utilized in a myriad of applications including automotive & mobility, specialty & portable lighting, entertainment & outdoor, projection & AR/VR displays, biomedical instrumentation & therapeutics, and industrial imaging & material processing. The company was recently ranked top 20 in Fortune magazine's "2021 Best Workplaces in Manufacturing & Production™," having promoted an employee-centric corporate culture since its founding. To learn more about KSLD, visit www.kyocera-sldlaser.com or contact the company at info@kyocera-sldlaser.com or 1-866-753-5273.

Document Revision History

Document Version	Document Date	Name	
V1.0 Draft	Jul 31, 2018	J. Carey	Template
1.1	Feb 9, 2020	D. Buller	Initial draft
1.2	Mar 13, 2020	D. Buller	Updated spectral distribution, added circuit diagram, intensity vs angle for IR, lumens vs current, watts IR vs current, vs voltage white, current vs voltage IR, luminance vs xy for white spot.
1.3	Apr 7, 2020	D. Buller	Updated current vs voltage IR and current vs watt IR
1.4	Apr 15, 2020	D. Buller	Updated current vs forward voltage and current vs lumens
1.5	Apr 16, 2020	J. Carey	Revised intensity vs. angle for white
1.6	Apr 28, 2020	J. Carey	Derating curve added
1.7	Sep 30, 2020	J. Carey	Thermal information added
1.8	Oct 16, 2020	J. Carey	Intensity distribution revised
1.9	Mar 1, 2021	J. Carey	Added wavelength, IEC safety class
2.0	May 18, 2021	J. Carey	New wavelengths added
2.1	Jun 15, 2021	J. Carey	Labeling
2.2	Aug 7, 2021	J. Carey	Revision of safety information
2.3	Aug 26, 2021	J. Carey	Label revision
2.4	Sep 15, 2021	K. Hanna, J. Carey	Wavelength labeling
2.5	Sep 24, 2021	J. Carey	Label
2.6	Nov 11, 2021	J. Carey	Kyocera logo
2.7	Feb 16, 2022	J. Carey	Additional packaging
A	Aug 30, 2022	R. Hinahon	Updated version for PLM and Release part numbers. Clarifications made on graphics, diagrams, and layout.