YUJILEDS® Multichromatic series LED datasheet

YJ-BC-RGBWW-7070M-G03

Surface Mount Device

Applications

- High-end architectural lighting
- Photographic/broadcast lighting
- Photoelectric device and relevant research

Features

- Industrial highest CRI performance of white light
- Full-color gamut of red, green and blue
- 6.9mm × 6.9mm package
- TLCI & TM-30 specified (white light)
- SimpleBinning solution (white light)

About Yujileds®

Document Number: YJWJ071

Rev Version: 2.2

P3190003.00

Table of Contents

General description

Yujileds® Multichromatic series 7070M LED is an innovative mid-power LED. It integrates five different color channels in a compact package. With Yujileds® advanced phosphors technology, the white light channels achieve industrial highest CRI performance and consistency, and the color channels reach saturated and stable monochromatic. The compact package and high output make the LED suitable for a wide variety of applications demanding higher color quality and homogeneous lighting distribution, and it also simplify the optical design.

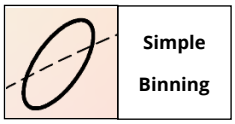
The Multichromatic series 7070M LED also supports the unique service/certification by Yujileds® as described below.

TM-30-18 specification

The most advanced colorimetric for color rendition, widely recognized as the successor of CRI.

TLCI specification

Based on the Macbeth ColorChecker, for evaluating the colorimetric quality of the broadcast lighting.



SimpleBinning specification

Simplify the chromaticity binning with TrueChroma data support to provide the most economical, simple, and practical solution to customers.

RoHS 2011/65/EU compliance

CE compliance

REACH compliance (Phosphor)

Ordering information

PART NUMBER	PRODUCT CODE	CCT	CHROMATICITY BINS	VOLTAGE RANGE
YJ-BC-RGBWW-7070M-G03-2765	P3190003.26	2700K-6500K	27M / 65M	0.2V

Characteristics

Electrical-optical characteristics (T_A = 25°C, 150mA)

COLOR	PARAMETER	SYMBOL	VALUE			UNIT
			MIN.	TYP.	MAX.	
Red	**Forward voltage**	V_F	1.9	-	2.5	V
	Luminous flux	Φ	18	20	22	lm
	Dominant wavelength[1]	λ	619	622	625	nm
	View angle	$2\theta_{1/2}$	-	120	-	Deg
	Reverse current	I_r	-	-	5	μA
	Thermal resistance[2]	$R_{\theta JS}$	-	10.19	-	°C/W
Green	**Forward voltage**	V_F	2.8	-	3.4	V
	Luminous flux	Φ	38	41	44	lm
	Dominant wavelength	λ	520	522.5	525	nm
	View angle	$2\theta_{1/2}$	-	120	-	Deg
	Reverse current	I_r	-	-	5	μA
	Thermal resistance	$R_{\theta JS}$	-	13.81	-	°C/W
Blue	**Forward voltage**	V_F	3.0	-	3.4	V
	Luminous flux	Φ	7.5	9	10.5	lm
	Dominant wavelength	λ	457.5	-	460	nm
	View angle	$2\theta_{1/2}$	-	120	-	Deg
	Reverse current	I_r	-	-	5	μA
	Thermal resistance	$R_{\theta JS}$	-	11.88	-	°C/W
2700K	**Forward voltage**	V_F	3.0	-	3.4	V
	Luminous flux	Φ	38	-	43	lm
	Correlated color temperature[1]	CCT	2600	2700	2800	K
	Color rendering index	Ra	95	-	-	-
	TCS R9 (CRI red)	R9	-	90	-	-
	Fidelity index[3]	Rf	-	94	-	-
	Gamut index[3]	Rg	-	101	-	-
	TLCI 2012[4]	-	-	97	-	-
	View angle	$2\theta_{1/2}$	-	120	-	Deg
	Reverse current	I_r	-	-	5	μA
	Thermal resistance	$R_{\theta JS}$	-	13.67	-	°C/W

Characteristics

Electrical-optical characteristics (T_A = 25°C, 150mA) (continued)

COLOR	PARAMETER	SYMBOL	VALUE			UNIT
			MIN.	TYP.	MAX.	
6500K	**Forward voltage**	V_F	3.0	-	3.4	V
	Luminous flux	Φ	43	-	48	lm
	Correlated color temperature	CCT	6150	6500	6850	K
	Color rendering index	Ra	93	95	-	-
	TCS R9 (CRI red)	R9	-	90	-	-
	Fidelity index	Rf	-	94	-	-
	Gamut index	Rg	-	101	-	-
	TLCI 2012	-	-	97	-	-
	View angle	$2\theta_{1/2}$	-	120	-	Deg
	Reverse current	I_r	-	-	5	μA
	Thermal resistance	$R_{\theta JS}$	-	13.05	-	°C/W

1. Yujileds® promises the chromaticity coordinate tolerance of ±0.0015 (CIE 1931 x,y) based on Yuji standard equipment shall prevail.
2. The data of thermal resistance is only for reference.
3. Defined by the IES TM-30-18 method, this data is for trial.
4. Defined by the EBU, TLCI is the abbreviation of Television Lighting Consistency Index, this data is for trial.

Characteristics

Absolute maximum ratings (T_A = 25°C)

PARAMETER	SYMBOL	RED	GREEN	BLUE	2700K	6500K	UNIT
Power Consumption (Simultaneous)	P_D	360	576	576	576	576	mW
DC Forward Current (pulsed)[1]	I_{Fp}[2]	360	360	360	360	360	mA
DC Forward Current	I_F	180	180	180	180	180	mA
Reverse Voltage	V_R	5	5	5	5	5	V
Solder Point Temperature[3]	T_s	85					°C
Operating Temperature	T_{opr}	-25 ~ +85					°C
Storage Temperature	T_{stg}	-35 ~ +85					°C
Soldering Temperature	T_{sol}	180 ± 5					°C
Reflow Cycles Allowed	-	2					-

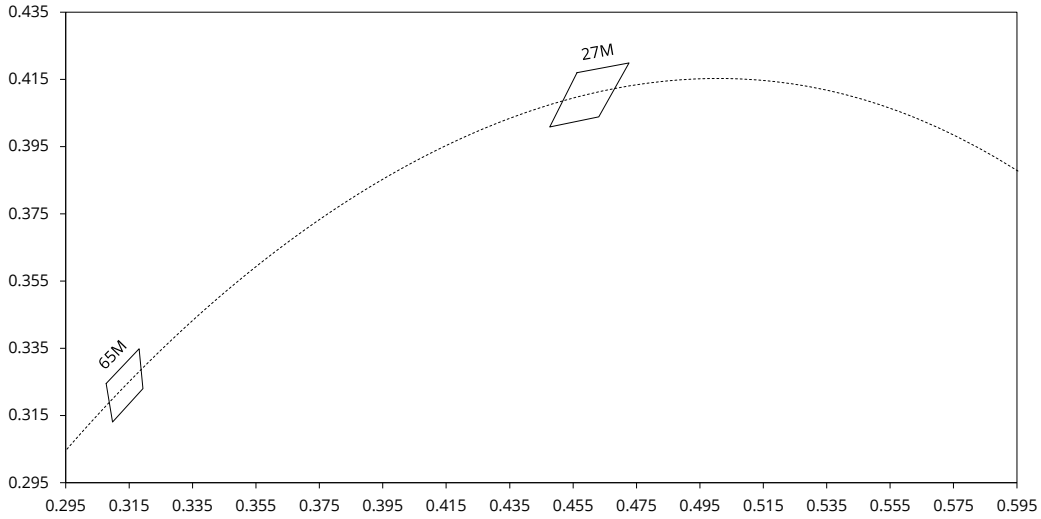
1. Pulse width ≤ 0.1ms, duty ≤ 1/10.
2. Theoretical data.
3. See page **Package material and dimension**.

Chromaticity group and diagram

Chromaticity bins & coordinates

CCT	BIN	CIE 1931 COORDINATES							
		X0	Y0	X1	Y1	X2	Y2	X3	Y3
2700K	27M	0.4562	0.4170	0.4477	0.4009	0.4631	0.4039	0.4727	0.4199
6500K	65M	0.3078	0.3245	0.3098	0.3131	0.3193	0.3230	0.3181	0.3349

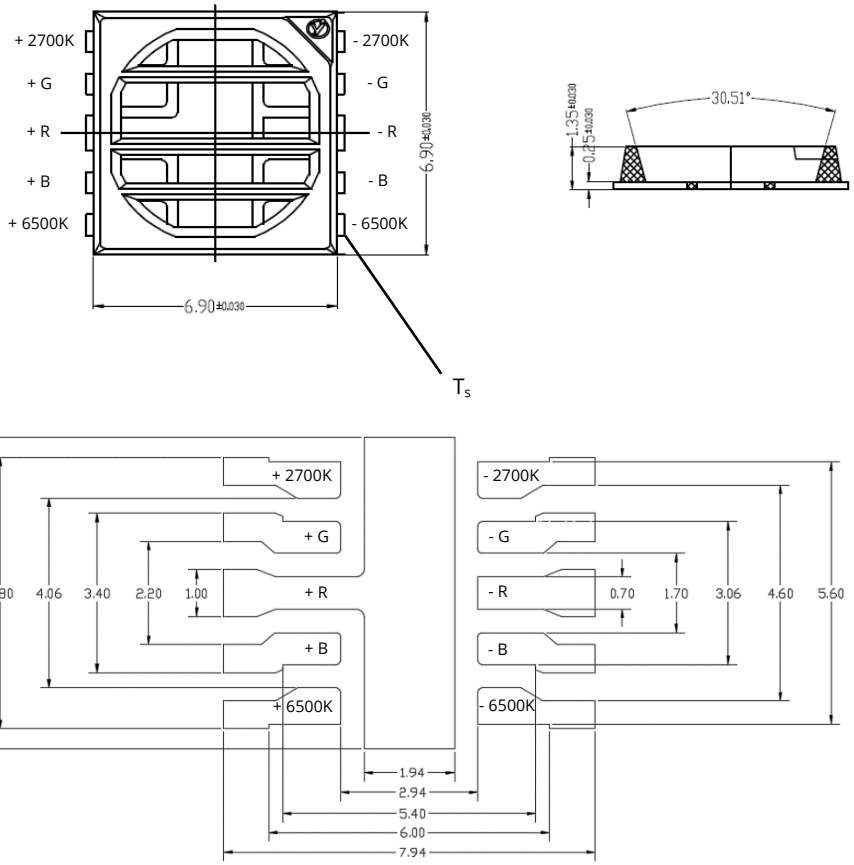
CIE 1931 diagram



Package dimension

Package layout

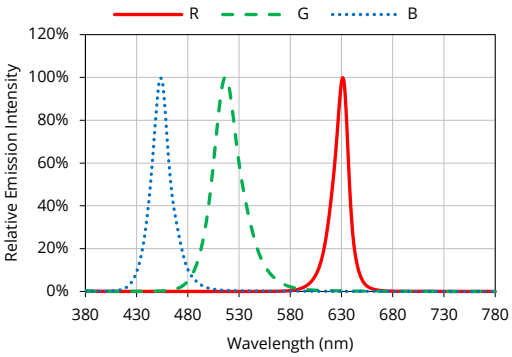
All dimensions in mm, tolerance unless mentioned is ±0.1mm.

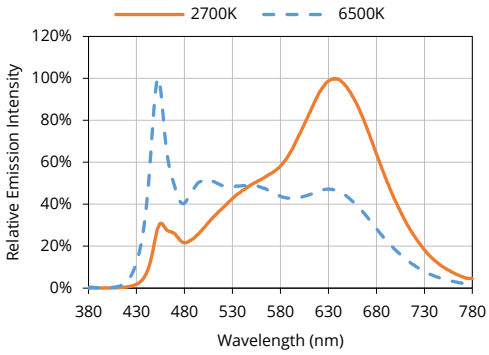


Characteristic graph

Typical spectral power distribution (T_A = 25°C, I_F = 150mA) (normalized)

All characteristic curves are for reference only and not guaranteed.

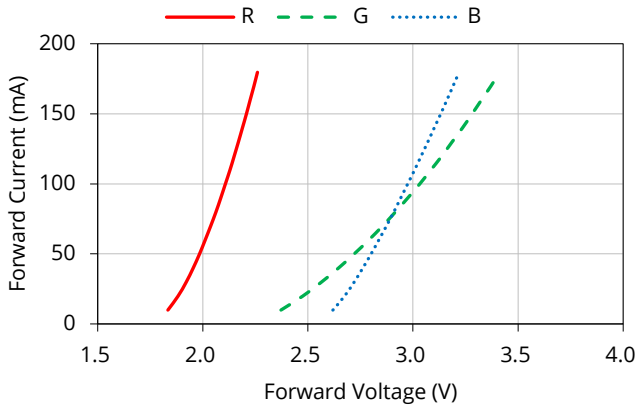




Characteristic graph

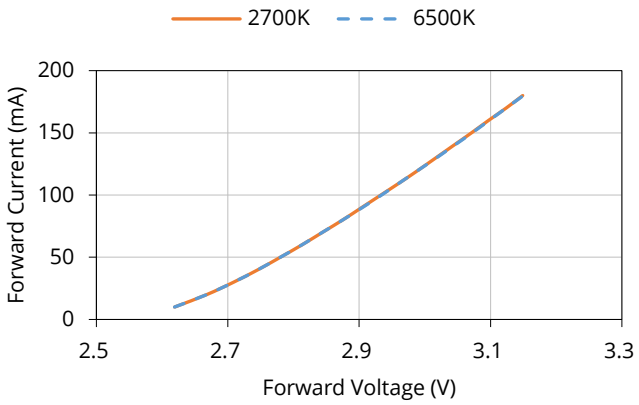
Forward current

All characteristic curves are for reference only and not guaranteed.



Vs. forward voltage

(T_A = 25°C)



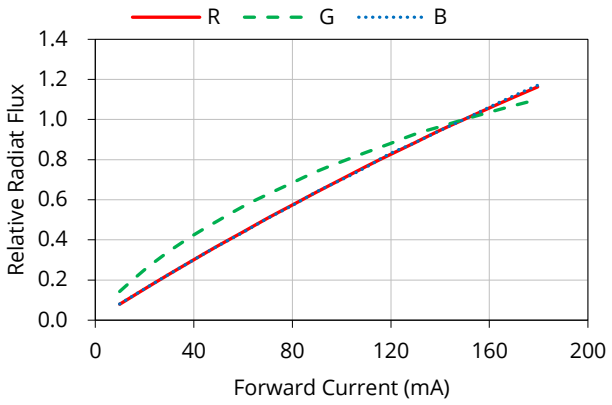
Characteristic graph

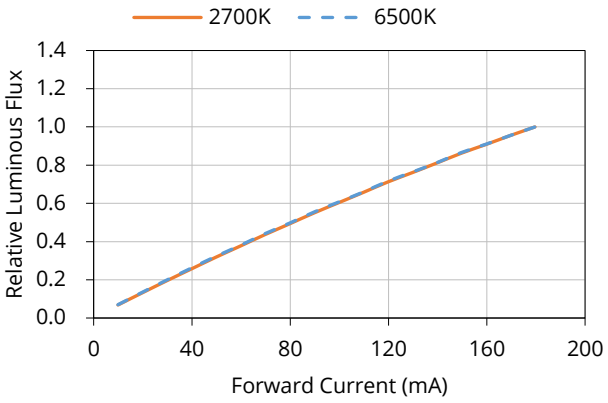
Forward current (continued)

All characteristic curves are for reference only and not guaranteed.

Vs. relative radiant flux / luminous flux

(T_A = 25°C)





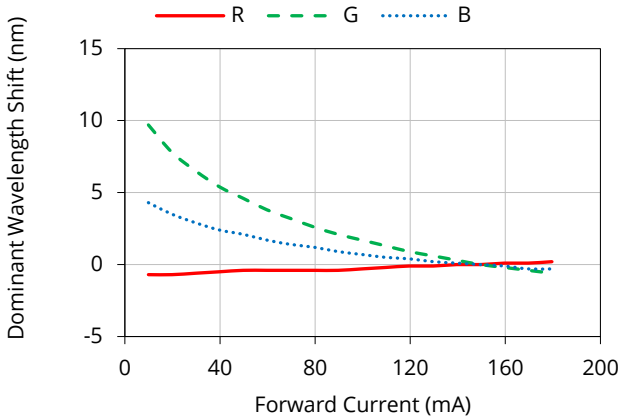
Characteristic graph

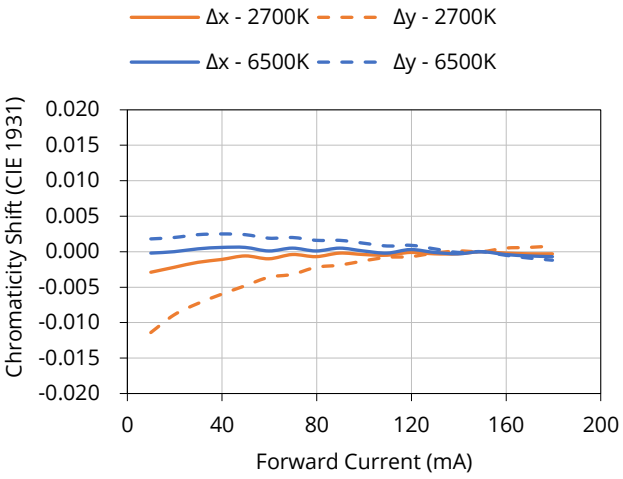
Forward current (continued)

All characteristic curves are for reference only and not guaranteed.

Vs. relative dominant wavelength shift / chromaticity shift

(T_A = 25°C)

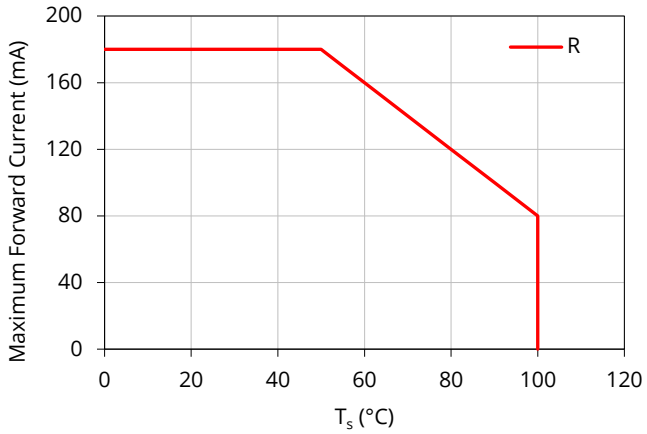




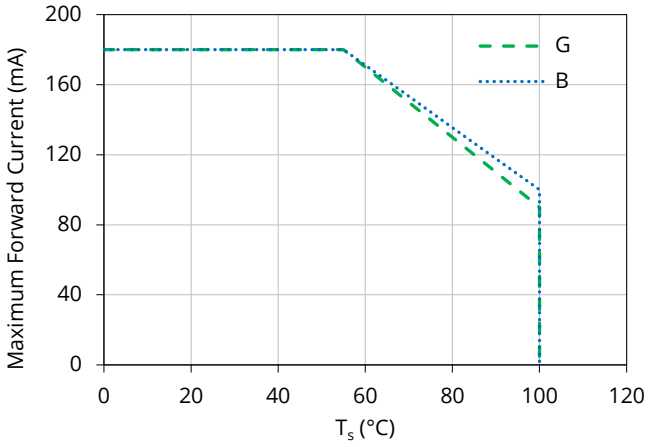
Characteristic graph

Forward current (continued)

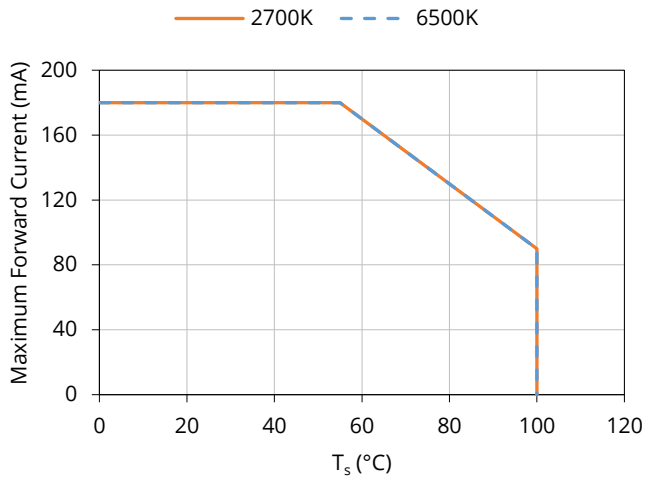
All characteristic curves are for reference only and not guaranteed.



Derating based on solder point



Note: De-rating curves are meant for recommendation only and are not meant to provide guarantees of product stability and longevity.



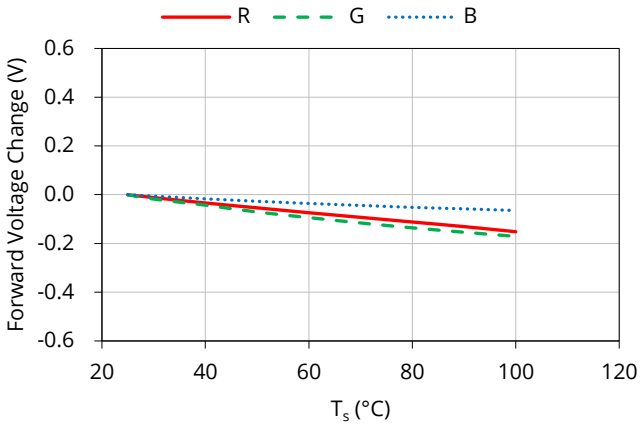
Characteristic graph

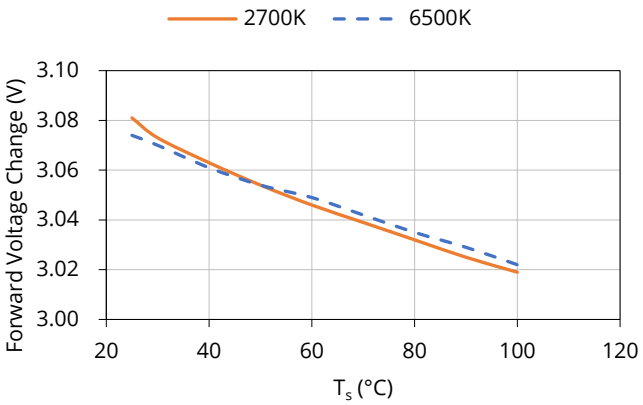
Solder point temperature (T_s)

All characteristic curves are for reference only and not guaranteed.

Vs. forward voltage

(I_F = 150mA)





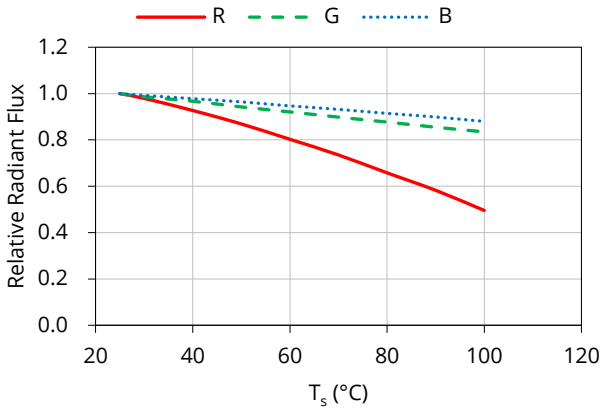
Characteristic graph

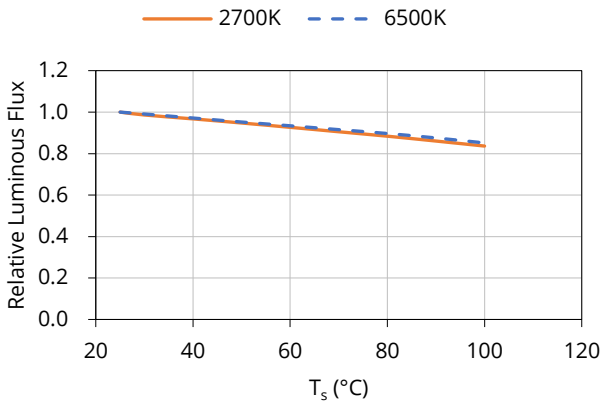
Solder point temperature (T_s) (continued)

All characteristic curves are for reference only and not guaranteed.

Vs. relative radiant flux / luminous flux

(I_F = 150mA)





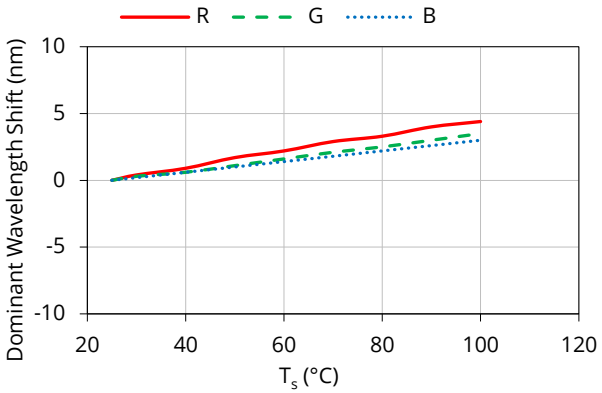
Characteristic graph

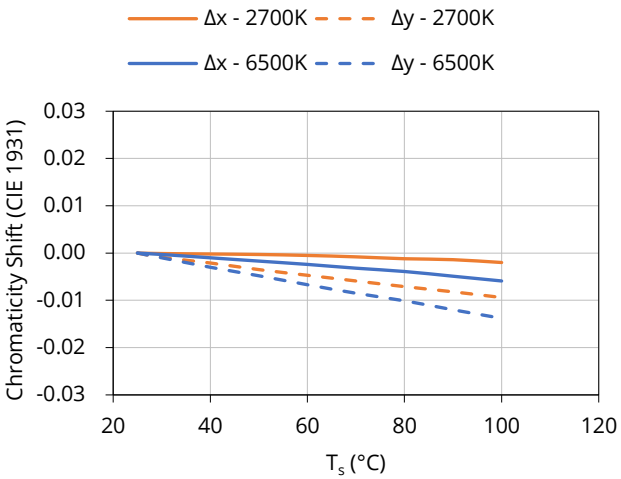
Solder point temperature (T_s) (continued)

All characteristic curves are for reference only and not guaranteed.

Vs. relative dominant wavelength shift / chromaticity shift

(I_F = 150mA)

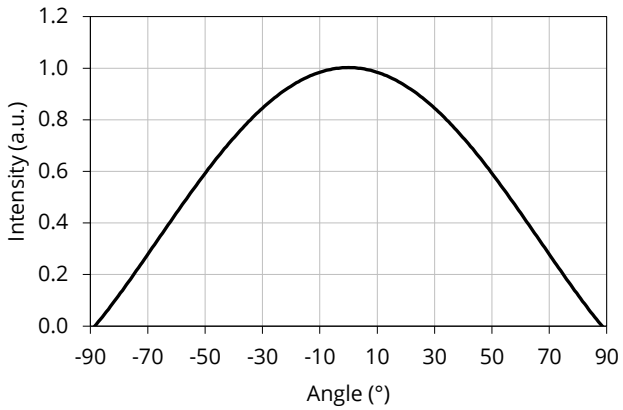




Characteristic graph

Spatial distribution (T_A = 25°C, I_F = 150mA)

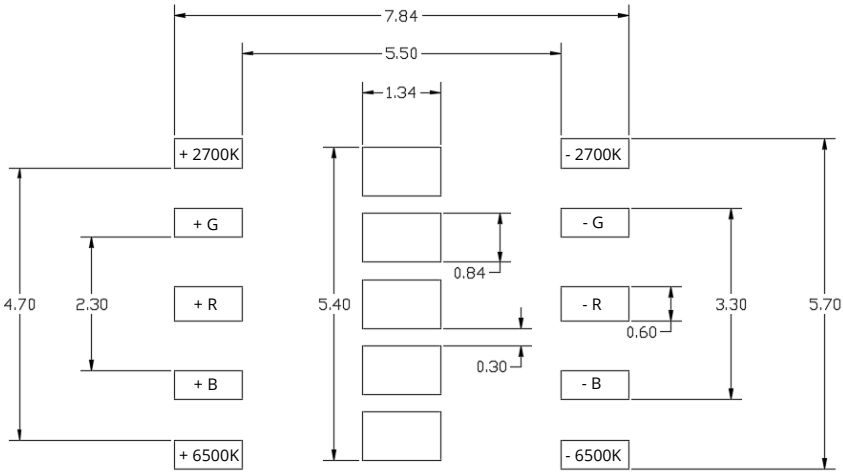
All characteristic curves are for reference only and not guaranteed.



Solder and reflow instruction

Steel stencil

Thickness 0.1mm-0.12mm, reducing the stencil by 10%-30% could help with improving the solder balls effectively. All dimensions in mm, tolerance unless mentioned is ±0.1mm. (Download the CAD file)

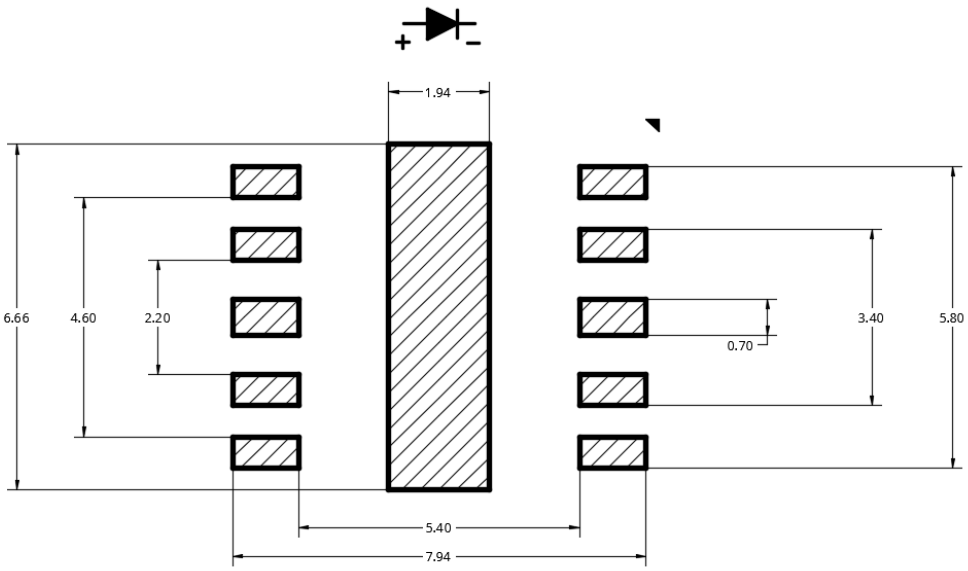


Recommended solder paste

Indium 5.7LT-1 (Download the datasheet)

Recommended solder pad layout

All dimensions in mm, tolerance unless mentioned is ±0.1mm.

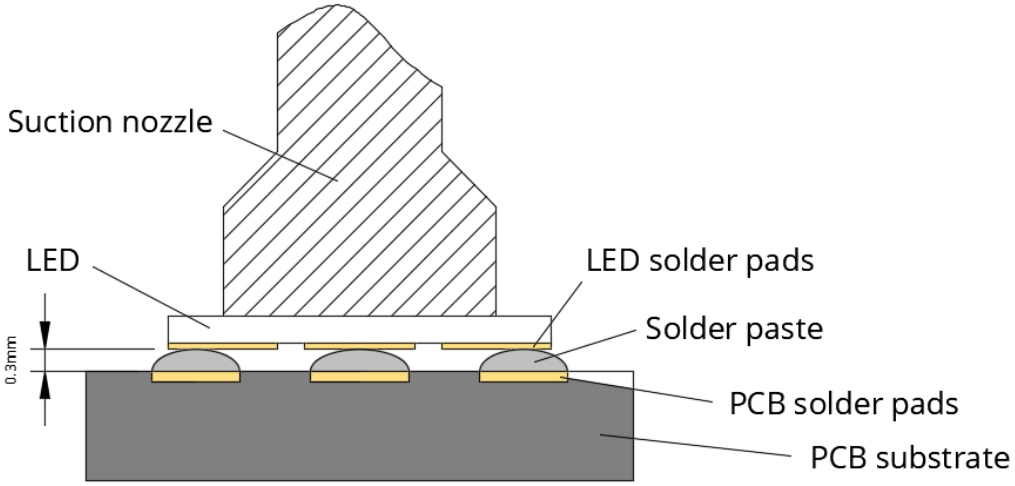


Recommended PCB process

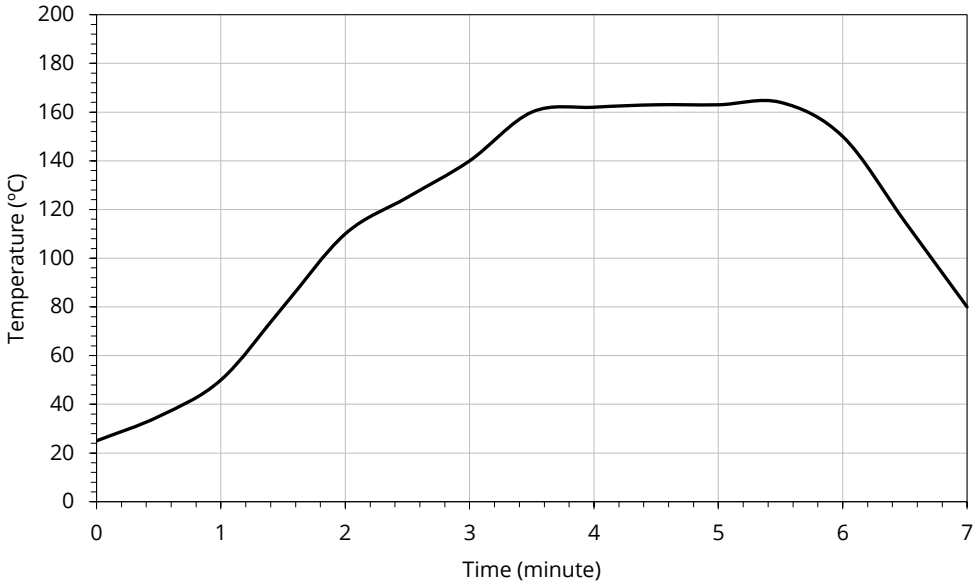
ENIG or OSP is recommended, HASL should NOT be applied.

Solder pressure

The distance between the LED solder pads and PCB solder pads is 0.3mm, this is to avoid high pressure of the suction nozzle to generate solder balls.



Soldering ramp-up time (Pb-FREE).



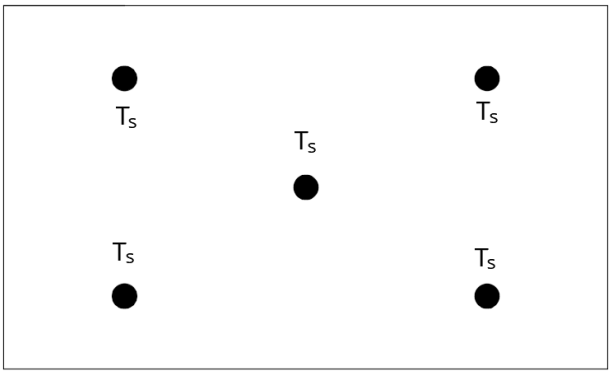
Based on Indalloy®282 solder paste.

- Heating phase.
  Temperature increase speed 0.5 – 1.0°C/second.

- Liquid phase.
  Peak temperature is 25 - 45°C higher than the melting point of the solder alloy. The reflow temperature should NOT be above 185°C.
- Cooling phase.
  Temperature decrease speed 2 - 6°C/second.

Evaluation of eligible soldering process

- Evaluate the actual temperature referring to the profile in the Indium 5.7LT-1 datasheet, the temperature should never be over 185°C.
- Pick at least five Ts points (depends on the PCB size) to evaluate the temperature.



- The ideal solder effect (after removing the LED on the PCB, irreversible[1] evaluation).
- Thrust evaluation (irreversible). The eligible thrusts for 7070 and other common components:
  7070 LED: >8kg
  0805 resistor: >5kg
  1206 resistor: >5kg
  2010 resistor: >5kg
  SOP-8 component: >5kg

1. Irreversible means the tested sample should not be used after the evaluation.

SMT instruction

Problems caused by improper selection of collet

Choosing the right collet is important in ensuring product quality after SMT. LEDs are different from other electronic components, as they are not only concerned with electrical output but also optical output. This characteristic makes LEDs more fragile in the process of SMT. If the collet's lowering height is not well set, it will bring damage to the gold wire at the time of collet's pick-and-place process which can cause the LED to not illuminate, flicker or contribute to other quality problems, some of which may not be immediately detectable.

Collet selection

During SMT, please choose the appropriate collet in order to avoid damage the gold wire inside the LED or insufficient suction. Setting the height of the collet is crucial in order to avoid damage to the top view SMD. If the collet setting is set to too low of an altitude, the collet will press down on the SMD, causing damage or breakage to the encapsulant and cause distortion or breakage of the gold wire.

Other notes of caution

- No pressure should be exerted to the epoxy shell of the SMD under high temperature.
- Do not scratch or wipe the lens since the lens and gold wire inside are rather fragile and cross out easy to break.
- LED should be used as soon as possible when being taken out of the original package, and should be stored in anti-moisture and anti-ESD package.
- This usage and handling instructions are for reference only.

About Yujileds

The Yuji story

Yuji started with LED phosphor materials in 2006, and today we are known for nitride red LED phosphor with superior brightness and stability in the world. With the rapid growth in LED industry during the past years, we have serviced over 260 business customers in over 33 different countries or regions, and established subsidiaries or distributors in 6 locations including China, US, UK and Japan, now we are reaching the global markets with the full coverage efficiently.

Our capabilities and achievements

In Yujileds®, we are a group of people passionate in creating the maximum value for customers. Dedicated to developing LED phosphor, LED light source and final products, we have accumulated unique experience in different projects. Nowadays, over 30 experts are gathered in a variety of areas including but not limited to semiconductor, chemistry, optics, photoelectricity, circuitry, materials and color science.

In commercial markets, we have been dedicating to providing comprehensive solutions for specific applications by deeply understanding these markets. Our goal is not only to offer an LED product simply but is to grow with customers and share the success of a business.

Main website: www.yujiintl.com
Find the comprehensive introduction of Yuji company and our insights into a variety of advanced technologies and applications.
Contact: info@yujigroup.com

Subordinative website: www.yujileds.com
Find more about our products, technical posts, featured support and service, blogs, news and whatever interesting and practical information.
Contact: contact@yujileds.com

Online shop: store.yujiintl.com
Find your favorite Yujileds® products with outstanding quality, fast shipment and superb sale service.
Contact: webstore@yujigroup.com