

# YJ-BC-RGBWW-7070M-G03

### **Surface Mount Device**



### **Applications**

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

#### **Features**

- Industrial high 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)

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### **Notification**

The Yujileds® 7070M LED is designed in a specific structure hence it demands specific SMT materials and reflow processes, we kindly remind you to pay extra attention to the part <u>Solder and reflow instruction</u> (Page 20 – 22) before the use.

### **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.



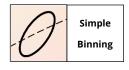
#### TM-30-18 specification

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	PRODUCT	CCT	CHROMATICITY	VOLTAGE	
NUMBER	CODE	CCI	BINS	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     MIN.     TYP.     MAX.       Red     Forward voltage     V <sub>F</sub> 1.9     -     2.5       Luminous flux     Φ     24     26     28       Dominant wavelength <sup>(1)</sup> λ     619     622     625       View angle     2θ <sub>1/2</sub> -     120     -       Reverse current     Ir     -     -     5       Thermal resistance <sup>(2)</sup> R <sub>0JS</sub> -     10.19     -       Luminous flux     Φ     42     46     50       Dominant wavelength <sup>(1)</sup> λ     520     522.5     525       View angle     2θ <sub>1/2</sub> -     120     -       Reverse current     Ir     -     -     5       Thermal resistance <sup>(2)</sup> R <sub>0JS</sub> -     13.81     -       Forward voltage     V <sub>F</sub> 3.0     -     3.4       Luminous flux     Φ     9     10.5     12	V Im nm Deg μA
	lm nm Deg μA
	nm Deg μA
	Deg µA
	μΑ
	-
	°C/W
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	V
	lm
$\begin{tabular}{c ccccccccccccccccccccccccccccccccccc$	nm
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	Deg
Forward voltage     V <sub>F</sub> 3.0     -     3.4       Luminous flux     Φ     9     10.5     12	μΑ
<b>Luminous flux</b> Φ 9 10.5 12	°C/W
	V
Denti-part word   457.5	lm
Dominant wavelength <sup>(1)</sup> λ 457.5 - 460	nm
View angle $2\theta_{1/2}$ - 120 -	Deg
<b>Reverse current</b> I <sub>r</sub> 5	μΑ
Thermal resistance <sup>(2)</sup> $R_{\theta JS}$ - 11.88 -	°C/W
Forward voltage V <sub>F</sub> 3.0 - 3.4	V
<b>Luminous flux</b> Φ 41 - 46	lm
Correlated color temperature <sup>(1)</sup> CCT 2600 2700 2800	K
Color rendering index Ra 95	-
<b>TCS R9 (CRI red)</b> R9 - 90 -	-
<b>Fidelity index</b> <sup>(3)</sup> Rf - 94 -	-
Gamut index <sup>(3)</sup> Rg - 101 -	-
<b>TLCI 2012<sup>(4)</sup></b> 97 -	-
<b>View angle</b> $2\theta_{1/2}$ - 120 -	Deg
Reverse current I <sub>r</sub> 5	μΑ
Thermal resistance <sup>(2)</sup> $R_{\theta JS}$ - 13.67 -	μΛ

### **Characteristics**

Electrical-optical characteristics (T<sub>A</sub> = 25°C, 150mA) (continued)

COLOR	PARAMETER	SYMBOL -		LINUT		
	PAKAWETEK		MIN.	TYP.	MAX.	- UNIT
6500K	Forward voltage	$V_{F}$	3.0	-	3.4	٧
	Luminous flux	Ф	51	-	56	lm
	Correlated color temperature <sup>(1)</sup>	CCT	6150	6500	6850	K
	Color rendering index	Ra	94	96	-	-
	TCS R9 (CRI red)	R9	-	90	-	-
	Fidelity index <sup>(3)</sup>	Rf	-	94	-	-
	Gamut index <sup>(3)</sup>	Rg	-	101	-	-
	TLCI 2012 <sup>(4)</sup>	-	-	97	-	-
	View angle	2θ <sub>1/2</sub>	-	120	-	Deg
	Reverse current	l <sub>r</sub>	-	-	5	μΑ
	Thermal resistance <sup>(2)</sup>	$R_{\theta JS}$	-	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	$P_{D}$	360	576	576	576	576	mW	
(Simultaneous)								
DC Forward Current	I <sub>Fp</sub> <sup>(2)</sup>	360	360	360	360	360	mA	
(pulsed) <sup>(1)</sup>	'Fp	300	300	300	200	300	ША	
DC Forward Current	I <sub>F</sub>	180	180	180	180	180	mA	
Reverse Voltage	$V_R$	V <sub>R</sub> 5 5 5 5 5						
Solder Point	Ts				°C			
Temperature <sup>(3)</sup>	Is		85				C	
Operating	т			25 +05		°C		
Temperature	I opr	T <sub>opr</sub> -25 ~ +85						
Storage Temperature	T <sub>stg</sub> -35 ~ +85 °C							
Soldering			180 ± 5				°C	
Temperature	$T_{sol}$						C	
Reflow Cycles Allowed	- 2 -							

<sup>(1).</sup> Pulse width  $\leq 0.1$ ms, duty  $\leq 1/10$ .

<sup>(2).</sup> Theoretical data.

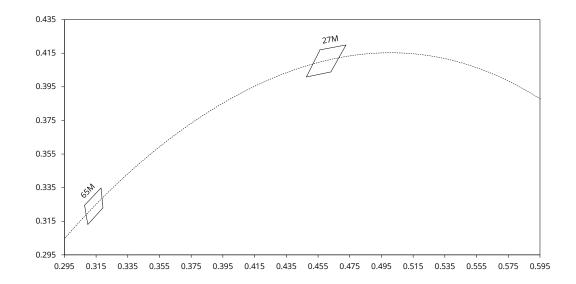
<sup>(3).</sup> See page Package material and dimension.

# **Chromaticity group and diagram**

### Chromaticity bins & coordinates

сст ві	DIN	CIE 1931 COORDINATES							
	BIN	XO	YO	X1	Y1	Х2	Y2	ХЗ	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

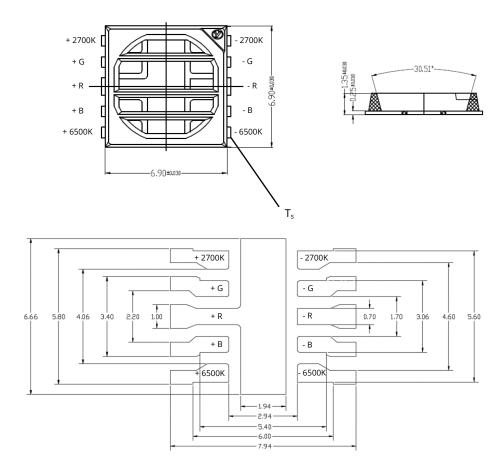
### CIE 1931 diagram



# **Package dimension**

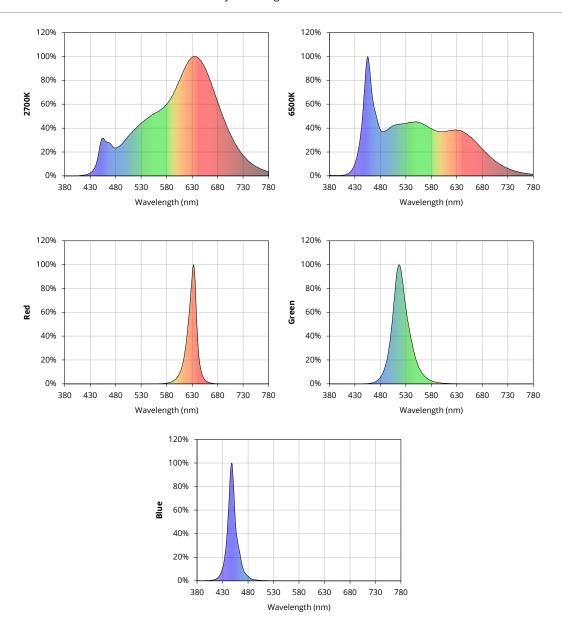
# Package layout

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



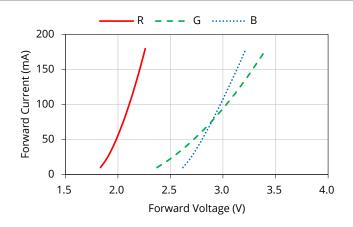
Typical spectral power distribution ( $T_A = 25$ °C,  $I_F = 150$ mA) (normalized)

All characteristic curves are for reference only and not guaranteed.



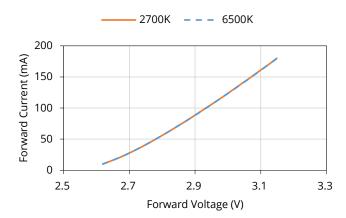
#### Forward current

All characteristic curves are for reference only and not guaranteed.



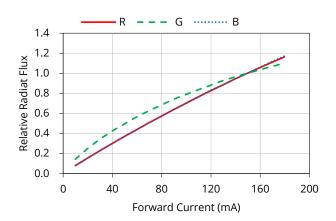
Vs. forward voltage

 $(T_A = 25^{\circ}C)$ 



### Forward current (continued)

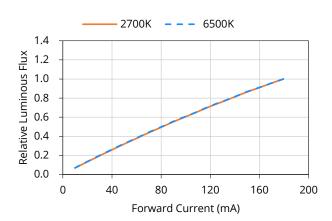
All characteristic curves are for reference only and not guaranteed.



Vs. relative radiant flux /

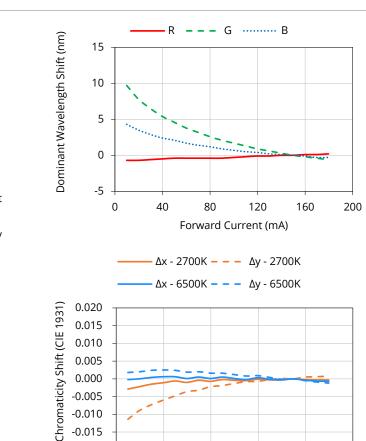
luminous flux

 $(T_A = 25^{\circ}C)$ 



### Forward current (continued)

All characteristic curves are for reference only and not guaranteed.



Vs. relative dominant

wavelength shift / chromaticity

shift

 $(T_A = 25^{\circ}C)$ 

-0.020

0

40

80

Forward Current (mA)

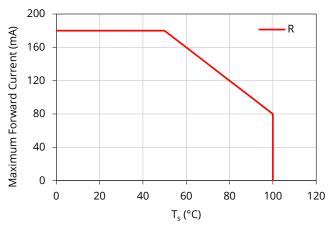
120

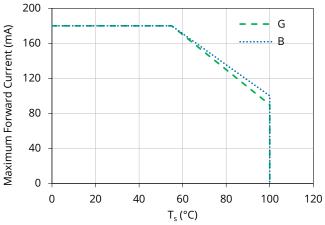
160

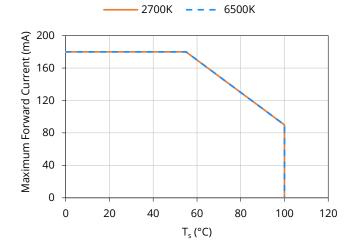
200

### Forward current (continued)

All characteristic curves are for reference only and not guaranteed.







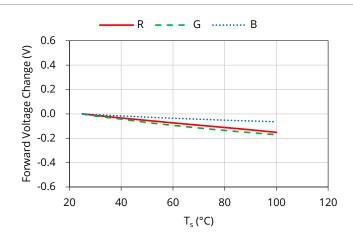
### Derating based on solder point

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



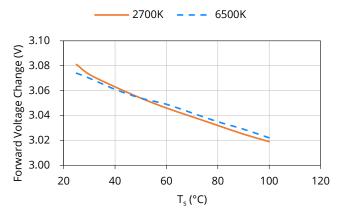
### Solder point temperature (T<sub>s</sub>)

All characteristic curves are for reference only and not guaranteed.



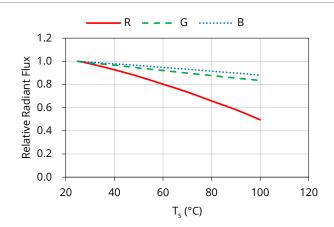
Vs. forward voltage

 $(I_F = 150mA)$ 



### Solder point temperature (T<sub>s</sub>) (continued)

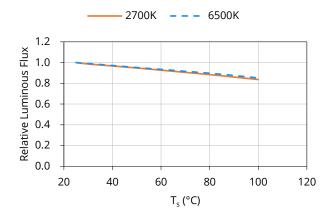
All characteristic curves are for reference only and not guaranteed.



Vs. relative radiant flux /

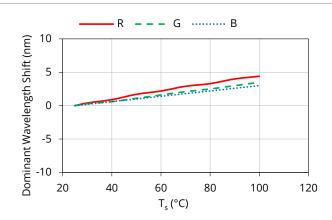
luminous flux

 $(I_F = 150mA)$ 



### Solder point temperature (T<sub>s</sub>) (continued)

All characteristic curves are for reference only and not guaranteed.

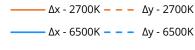


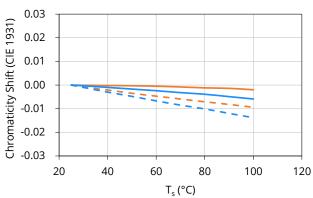
Vs. relative dominant

wavelength shift / chromaticity

shift

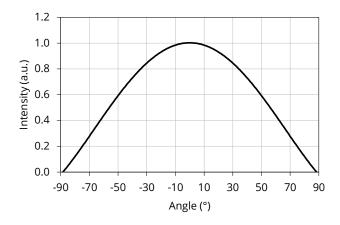
 $(I_F = 150mA)$ 





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

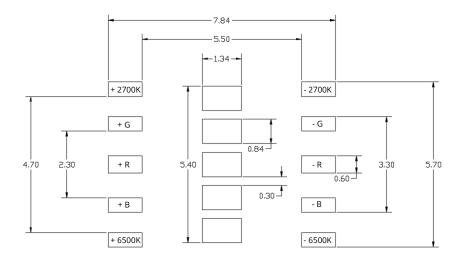
All characteristic curves are for reference only and not guaranteed.



### **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  $\pm 0.1$ mm. (Download the CAD file)



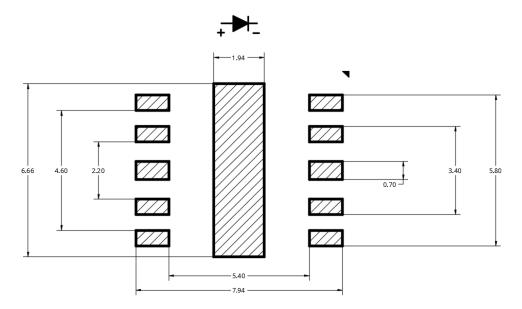
### Recommended solder paste

Indium 5.7LT-1 (Download the datasheet)



### Recommended solder pad layout

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

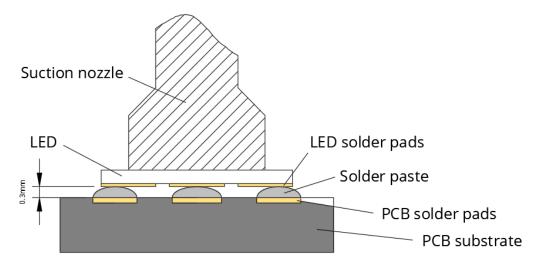


### Recommended PCB process

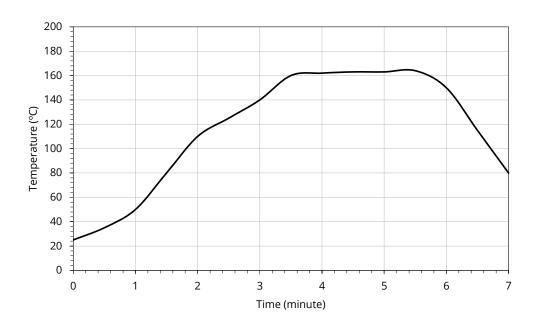
ENIG or OSP is recommended, HASL should NOT be applied.

### 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).



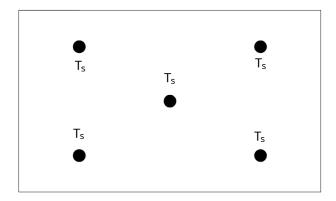
Based on Indalloy®282 solder paste.

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

- Liquid phase.
  - Peak temperature is  $25 45^{\circ}$ C higher than the melting point of the solder alloy. The reflow temperature should NOT be above  $185^{\circ}$ 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 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**



**Our story** - Start from the superior stable red LED phosphor.

We started to make LED phosphor materials in 2006. White LEDs were still in very early stage, the industry focused on improving device brightness and efficiency via yellow phosphor very much. No one cared about the light quality. Based on this situation, we took a different approach and focused on red phosphor technology, which is the most important phosphor recipe for high CRI and/or low CCT LEDs, and it made Yuji become a JV partner with Mitsubishi Chemical from 2012.

Today, we are well known for our comprehensive research and full line-up production of LED phosphor from ultra-violet to near-infrared, and we are proud to commit to providing superior stable and efficient phosphors to the worldwide markets.

#### Our technology - Focus on LED spectrum innovation.

The industrial structure of both phosphor and LED gives us a unique view to develop our spectrum recipes. Compared to the general LED manufacturers, we have comprehensive information in evaluating the feasibility for both technical and commercial aspects. LED spectrum technology is not only about the quality of white LEDs, but also for different applications which have specialized requirements in lighting.

Yuji is one of the few companies that provide the service of designing or customizing a specific spectrum for clients, our confidence comes from the years of accumulation in focusing on the spectrum technologies and the control of LED phosphor and LED die supply-chain with thousands of successful cases in the past years. Innovating LED technologies and giving them commercial values are our eternal driving forces.

#### Our product - Yujileds®, stands for high-performance LED.

The trademark of Yujileds® is the identification of the LED products developed and manufactured by Yuji. We put our understanding of the LED technologies and the standard of our quality control into every LED we make. Regardless of any product series, we pay attention to expressing the high-performance feature and achieving the product value for clients and never compromise in pursuing the true performance.

Furthermore, we also care about every detail of any documentation we prepare for the product because we

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understand the importance to transmit accurate information to clients. It is even more critical for clients to obtain

the truth to decide the solution, rather than just a nominal high-performance.

Our client - Outstanding game players in different fields.

Clients are our proudest achievements, now over 200 of our clients are the best game players in their fields in

more than 33 countries. We regard the clients' successes as our biggest accomplishments and appreciate their

contribution in different fields, clients use our LEDs not just for simple lighting, but to design the lighting for

plants, cameras, sensors, health, circadian rhythm, aminals, and other industries that we have never imagined

that our technologies can be utilized, that makes our work so meaningful.

Our service - Professional supporting team.

There is a group of people in Yuji passionate about creating maximum value for our clients. We have accumulated

experience in different projects. Currently, the company gathers more than 30 experts from various fields of

semiconductor, chemistry, optics, photoelectricity, circuitry, materials and color science.

Our sales team is well trained in deep LED technologies and has skilled global communication experience. Not

just for sales, our team is more like a specialized consultancy to help every client succeed in different projects,

and we do not only provide professional business service, but also support in the supply chain, logistics,

marketing and technical discussions.

**Contact us** - We look forward to providing our efficient service for you.

LED website: www.yujiintl.com

Find Yujileds® high-performance LEDs, read our insights into a variety of advanced technologies and

applications.

Contact: info@yujigroup.com

LED lighting website: www.yujilighting.com

Find our state-of-art LED lamps and luminaires designed for improving the lighting experience with the vision of

illuminating the future.

Contact: <a href="mailto:lighting@yujigroup.com">lighting@yujigroup.com</a>

Online shop: store.yujiintl.com

Shop your favorite Yuji Lighting product with rapid and professional service.

Contact: webstore@yujigroup.com