



SPECIFICATION FOR APPROVAL

Customer _____

Product Name 3535 FLIP LED

Part No. VO-LED-W3535F

Customer Part No. _____

Date 2016/01/01

APPROVED SIGNATURES			

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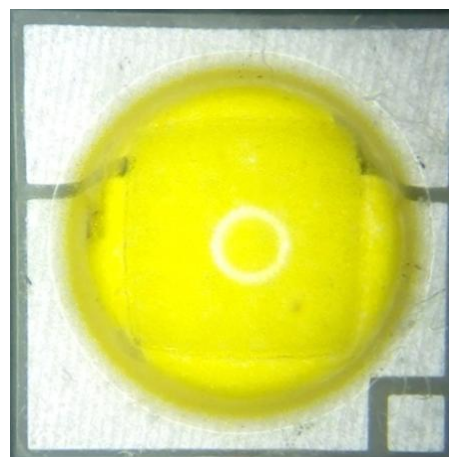
VaOpto is an Energy Star & DLC Partner

PRODUCT DESCRIPTION

This product combines high luminous, high illuminant efficiency and long working life with small package, wireless package, high reliability, support for SMT, it is generally used for common illuminate, architectural lighting, street lighting or commercial and entertainment decorative lighting. Such as MR16, AR111, PAR, and light bulb replacements.

FEATURES:

- High Luminance, high illuminant Efficiency
- Power: 1~3 W
- Wireless Package, Support for SMT

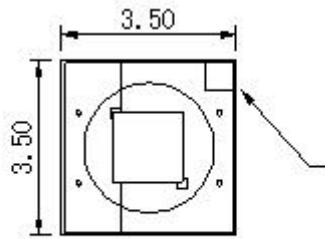


CATALOGUE

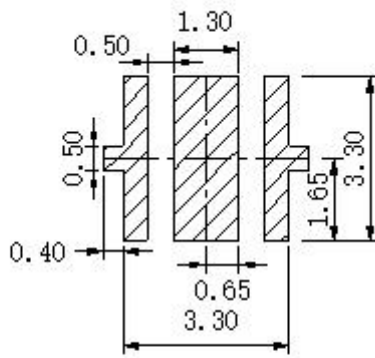
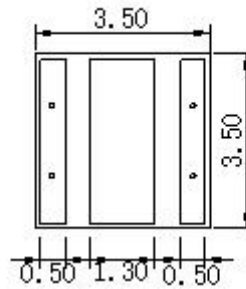
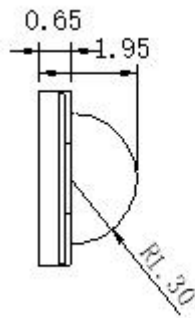
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*The Specifications of the product may be modified for improvement without notice.

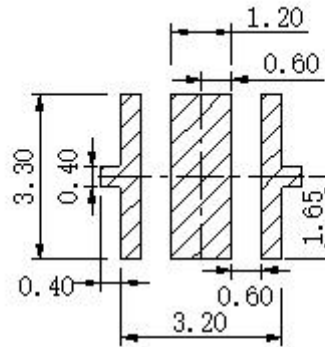
1.Outline Dimension



Squares Represent The Cathode



Recommended PCB Solder Pad



Recommended Stencil Pattern
(Hatched Area Is Opening)

All dimensions in mm, tolerances unless mentioned is ± 0.1 mm

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2. Characteristics

Electro-Optical Characteristics (Temperature=25°C)

Parameter	Symbol	Condition	TYPE	MIN	Typ.	Max.	Unit	Note
Forward Voltage	VF	I _F =350mA	-	2.6	3.0	3.4	V	Ranking test current I _T =350mA
		I _F =700mA		3.0	3.3	3.7		
		I _F =1000mA		3.4	3.6	4.0		
Reverse Current	I _R	V _R =5V	-	-	-	10	μA	-
Color temperature	T _c	I _F =350mA	CW	4700	6000	8200	K	Reference Ranking Criteria
			NW	3700	4000	4700		
			WW	2800	3000	3700		
CRI	R _a	I _F =350mA	-	-	70	-	-	-
Flux	Φ _v	I _F =350mA	CW	120	135	150	lm	Ranking test current I _T =350mA
			NW	115	130	145		
			WW	110	125	140		
		I _F =700mA	CW	-	230	-	lm	
			NW	-	220	-		
			WW	-	200	-		
		I _F =1000mA	CW	-	320	-	lm	
			NW	-	300	-		
			WW	-	275	-		
View Angle	2θ1/2	I _F =350mA	-	110	120	130	deg.	-
Thermal Resistance	R _θ	-	-	-	7	-	°C/W	-

Note: The above luminous flux measurement allowance tolerance is ±10%, color rendering index measurement allowance tolerance is ±1; color coordinates measurement allowance tolerance is ±0.01, forward voltage measurement allowance tolerance is ±0.1V.

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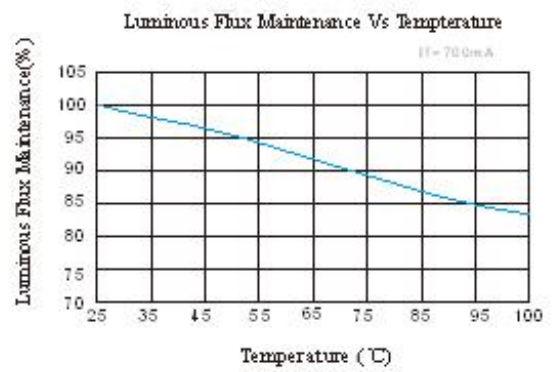
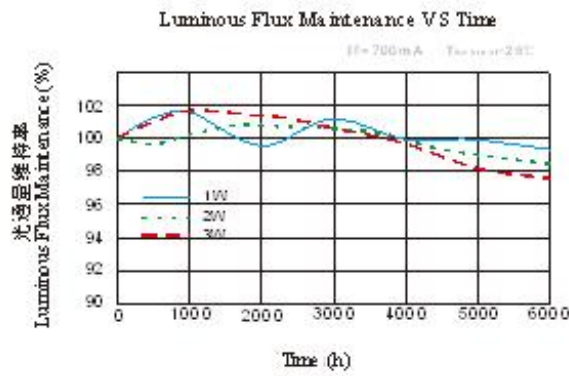
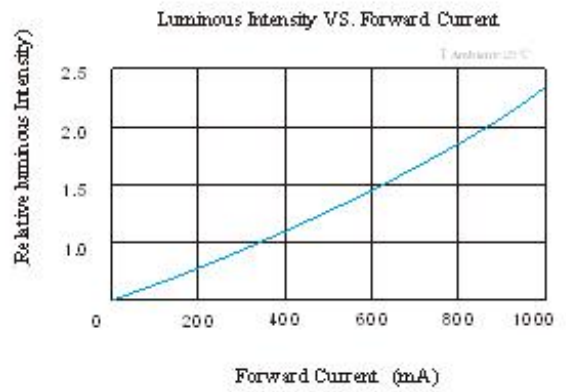
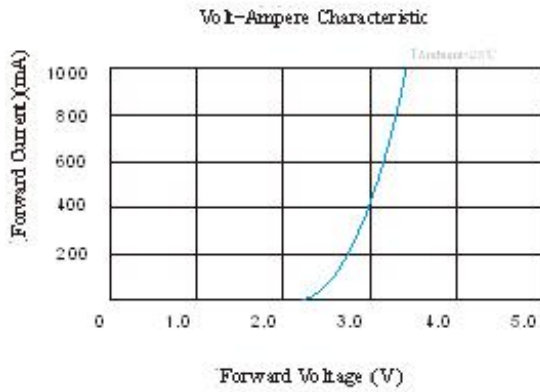
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Absolute Maximum Ratings (Temperature=25°C)

Parameter	Symbol	Rating	Unit
Forward Current	IF	1000	mA
Pulse Forward Current	IFP	1500	mA
Reverse Voltage	V _R	5	V
Limit power	Pd	3.7	W
Electro-Static discharge	ESD(HBM)	4000	V
Operating Temperature	T _{OPR}	-30 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
Junction Temperature	T _j	125	°C
		Reflow Soldering: 260 °C for 10 sec.	
Solder Temperature	T _{sol}	Hand Soldering: 350 °C for 3 sec.	

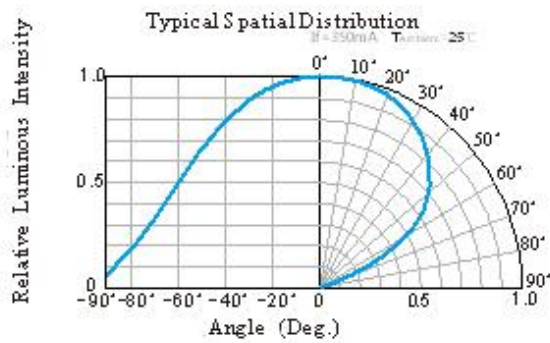
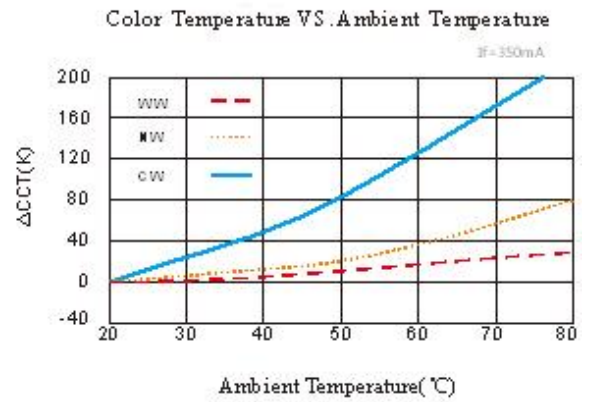
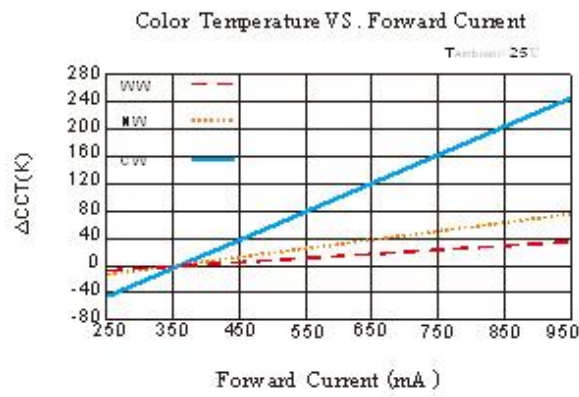
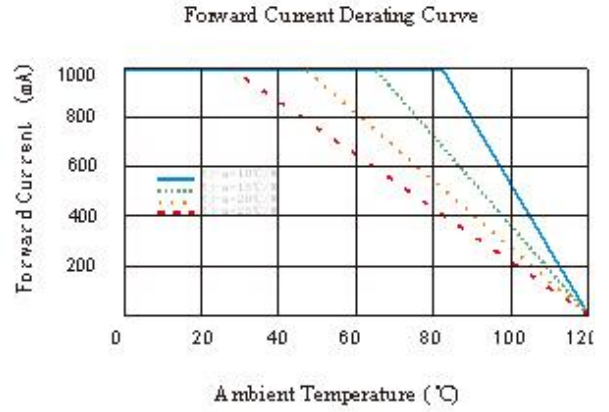
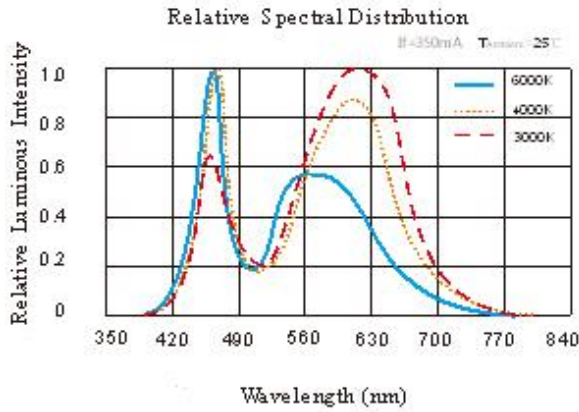
* Note: Pulse width≤0.1ms, Duty≤1/10

3. Typical Characteristics Curves



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4. Reliability Test Items And Conditions

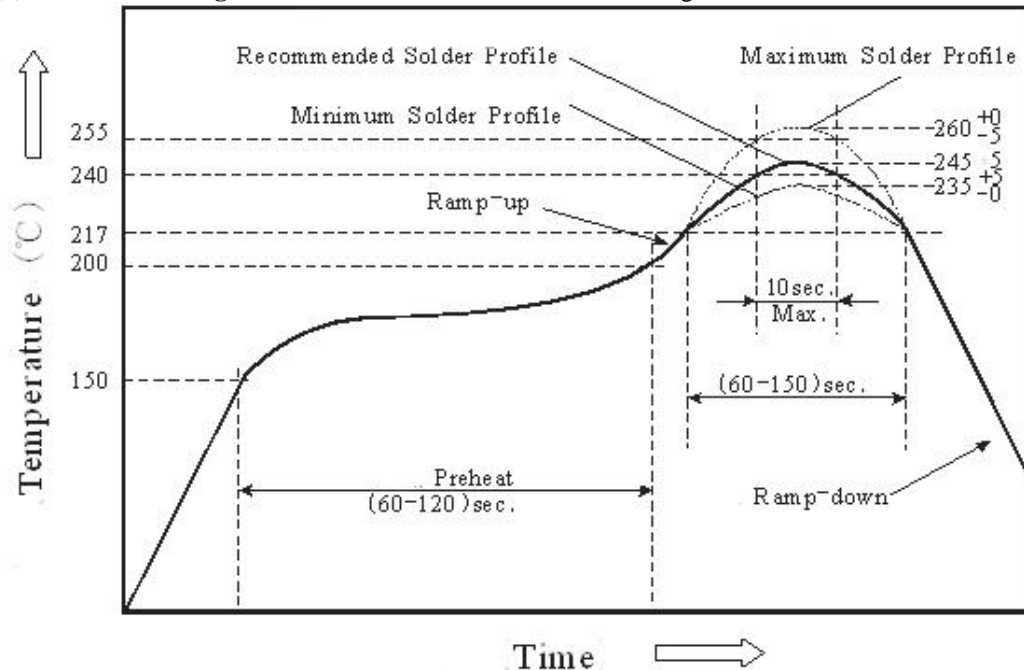
Test Items Test Items Test Items	Reference	Test Conditions	Time	Quantity	Criterion
Thermal Shock	MIL-STD-202G	-40(30min)←→100°C (30min)	100 cycles	22	0/22
Temperature And Humidity Cyclic	JEITA ED-4701 200 203	-10°C ~ 65°C , 0% ~ 90%RH 24hrs./1cycle	10 cycles	22	0/22
High Temperature Storage	JEITA ED-4701 100 103	Ta=85°C , RH=85%	1000h	22	0/22
Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	1000h	22	0/22
High Temperature High Humidity Storage	JEITA ED-4701 100 103	Ta=60°C , RH=90%	1000h	22	0/22
High Temperature Life Test	JESD22-A108D	Ta=85°C IF =850mA	1000h	22	0/22
Life Test	JESD22-A108D	Ta=25°C IF =10mA	1000h	22	0/22
Resistance to Soldering Heat	GB/T 4937,II, 2.2&2.3	Tsol*=(240±5)°C 10secs	2 times	22	0/22

Criteria For Component Damaging:

Parameter	Symbol	Condition	Criteria
Forward Voltage	V _F	I _F = I _{FT}	Initial Data±10%
Reverse Current	I _R	V _R = 5V	I _R ≤10μA
Luminous Flux	Φ _V	I _F = I _{FT}	Average I _V degradation≤30%; Single LED I _V degradation≤50%
Resistance to Soldering Heat		Tsol=260°C	Material without internal cracks , no material between stripped , no dead light.

5. Guideline for Soldering

(1) Reflow Soldering: Use the conditions shown in the under Figure of Pb-Free Reflow Soldering.



- Reflow soldering should not be done more than two times.
- Stress on the LEDs should be avoided during heating in soldering process.
- After soldering, do not deal with the product before its temperature drop down to room temperature.

(2) Cleaning

It is recommended that alcohol be used as a solvent for cleaning after soldering. Cleaning is to go under 30°C for 3 minutes or 50°C for 30 seconds. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not.

Ultrasonic cleaning is also an effective way for cleaning. But the influence of Ultrasonic cleaning on LED depends on factors such as ultrasonic power. Generally, the ultrasonic power should not be higher than 300W. Before cleaning, a pre-test should be done to confirm whether any damage to LEDs will occur.

* **Note:** This general guideline may not apply to all PCB designs and configurations of all soldering equipment. The technics in practice is influenced by many factors, it should be specialized base on the PCB designs and configurations of the soldering equipment.

6. Precautions

(1) Storage

- Moisture proof and anti-electrostatic package with moisture absorbent material is used, to keep moisture to a minimum.
- Before opening the package, the product should be kept at 30°C or less and humidity less than 60% RH, and be used within a year.
- After opening the package, the product should be stored at 30°C or less and humidity less than 60%RH, and be soldered within 24 hours (1 day). It is recommended that the product be operated at the workshop condition of 30°C or less and humidity less than 60%RH.
- If the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition: (80±5)°C for 24 hours.

(2) Static Electricity

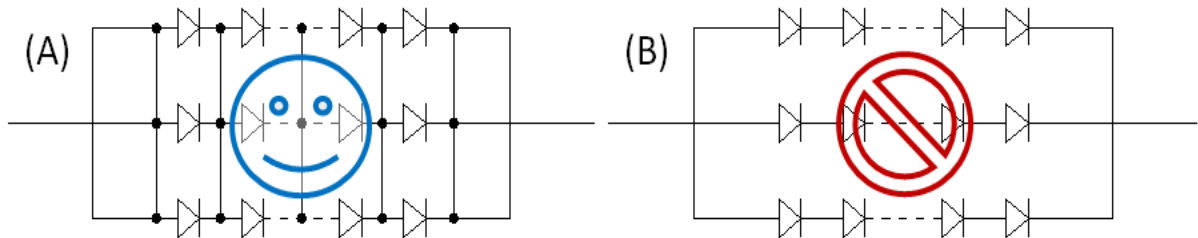
Static electricity or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs do not light at the low current., even not light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that wrist bands or anti-electrostatic gloves, anti-electrostatic containers be used when dealing with the LEDs.

(3) Design Consideration

In designing a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED. In the meanwhile, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen.

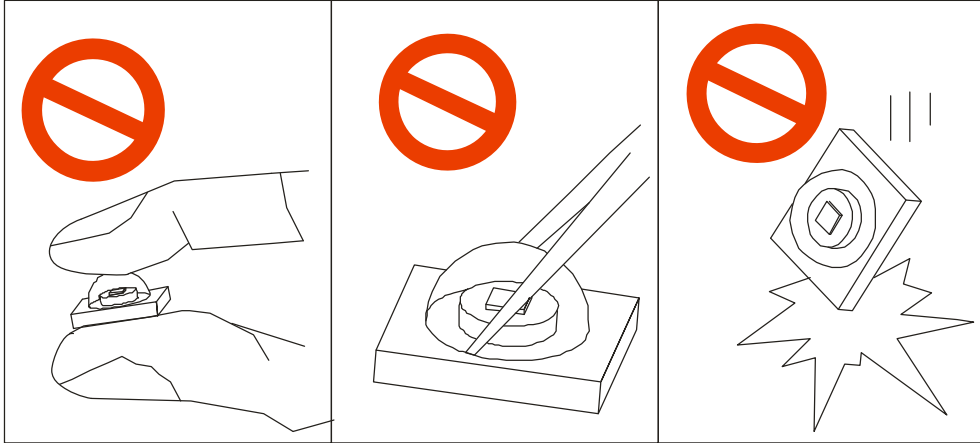
It is recommended to use Circuit (A) which regulates the current flowing through each LED rather than Circuit (B). When driving LEDs with a constant voltage in Circuit (B), the current through the LEDs may vary due to the variation in Forward Voltage (VF) of the LEDs. In the worst case, some LED may be subjected to stresses in excess of the Absolute Maximum Rating.



Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color changed and so on. Please consider the heat generation of the LEDs when making the system design.

(4) Miscellaneous

When handling the LEDs, touching the lens with bare hands will not only contaminate its surface, but also affect on its optical characters. Excessive force to the product might result in catastrophic failure of the LEDs. For this reason, please do not put excessive stress on LEDs, especially when the LEDs are heated such as during Reflow Soldering.



The lens of the product is fragile, so please avoid scratch or friction over the lens surface. While handling the product with tweezers, do not hold by the lens, be careful.

(5) Safety Advice For Human Eyes

Viewing direct to the light emitting center of the LEDs, especially those of great Luminous Intensity, will cause great hazard to human eyes. Please be careful.