



# Powerlux Technology Co., Ltd.



**Powerlux PLT-3528W  
Top LED  
Technical Datasheet  
Version: 1.0**

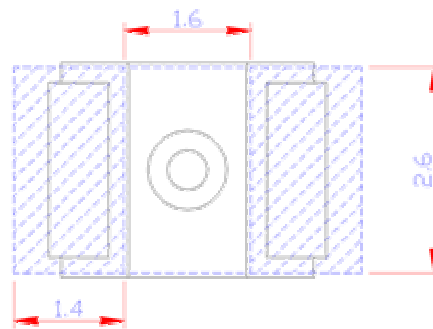
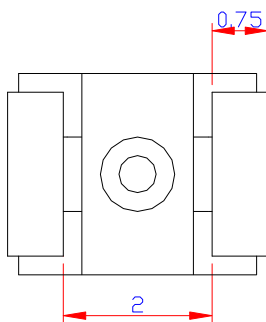
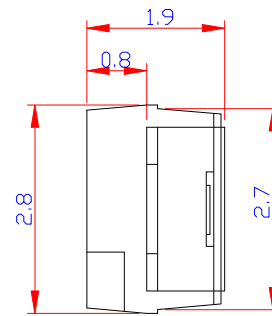
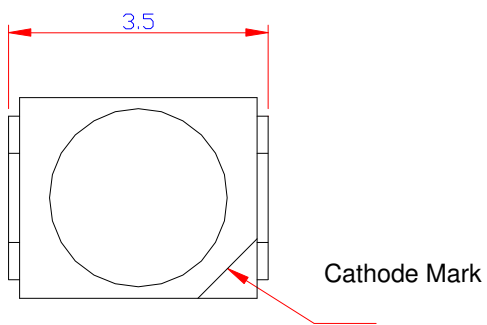
## Features

- High Luminous Intensity
- Wide Viewing Angle : 120°
- Reliable and robust
- ROHS compliant
- Suitable for all SMT assembly methods
- Qualified according to JEDEC moisture sensitivity Level 2a

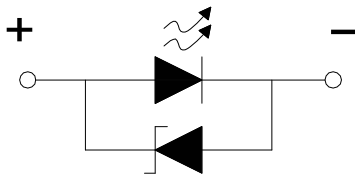
## Typical Applications

- Electronic signs and signals
- Indoor and Outdoor Displays
- Specialty lighting
- Small area illumination
- Backlighting

## Mechanical Dimensions



Recommended Soldering Pad



Notes:

1. All dimensions are in millimeters.
2. Tolerances  $\pm 0.2$  mm

### Absolute Maximum Ratings ( Ta = 25°C )

Item	Symbol	Value	Unit
DC Forward Current per Chip	IF	30	mA
Forward Peak Pulse Current	IFP [1]	100	mA
Reverse Voltage	VR	5	V
Power Dissipation	PD	120	mW
Operating Temperature	Topr	-30 ~ 85	°C
Storage Temperature	Tstg	-40 ~ 100	°C
LED Junction Temperature	Tj	125°C	°C

Notes :

[1]  $t \leq 0.1\text{ms}$ ,  $D = 1/10$

### Electro-Optical Characteristics ( Ta = 25°C, IF=20mA per chip )

Item	Symbol	Test Condition	Value			
			Min.	Typ.	Max.	Unit
Luminous Intensity [2]	<i>IV</i> [3]	20mA	600	1300	-	mcd
Forward Voltage [4]	<i>VF</i>	20mA	2.8	3.2	3.8	V
CIE Chromaticity	<i>ccx</i>	20mA		0.3		
	<i>ccy</i>			0.3		
Color Temperature	<i>CCT</i>	20mA	5000	6000	7000	K
View Angle	$2\theta \frac{1}{2}$	20mA		120		deg.
Reverse Current (at $VR = 5V$ )	<i>IR</i>	-	-	-	10	uA

Notes :

[2] Powerlux maintains a tolerance of  $\pm 10\%$  on intensity and power measurements.

[3] *IV* is the luminous intensity output as measured with a cylinder.

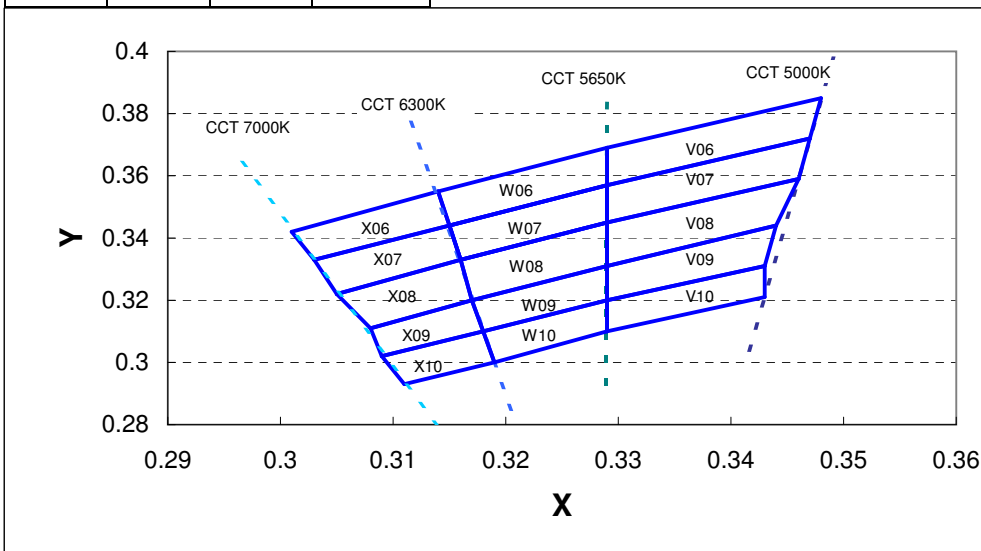
[4] A tolerance of  $\pm 0.05V$  on forward voltage measurements

### Rank For Luminous Intensity

Bin	lv(mcd)
A	600~780
B	780~1000
C	1000~1300
D	1300~1700
E	1700~2200

### Main Color Bins for White

Bin Code	X	Y	CCT (K)	Bin Code	X	Y	CCT (K)	
X06	0.314	0.355	6300~7000	W09	0.329	0.331	5650~6300	
	0.315	0.344			0.329	0.32		
	0.303	0.333			0.318	0.31		
	0.301	0.342			0.317	0.32		
X07	0.315	0.344		W10	0.329	0.32		
	0.316	0.333			0.329	0.31		
	0.305	0.322			0.319	0.3		
	0.303	0.333			0.318	0.31		
X08	0.316	0.333		V06	0.348	0.385		5000~5650
	0.317	0.32			0.347	0.372		
	0.308	0.311	0.329		0.357			
X09	0.305	0.322	V07		0.347	0.372		
	0.317	0.32			0.346	0.359		
	0.318	0.31			0.329	0.345		
X10	0.309	0.302	V08	0.329	0.357			
	0.308	0.311		0.346	0.359			
	0.318	0.31		0.344	0.344			
	0.319	0.3		0.329	0.331			
W06	0.309	0.302	V09	0.329	0.345			
	0.329	0.369		0.344	0.344			
	0.329	0.357		0.343	0.331			
	0.315	0.344		0.329	0.32			
W07	0.314	0.355	V10	0.329	0.331			
	0.329	0.357		0.343	0.331			
	0.329	0.345		0.343	0.321			
	0.316	0.333		0.329	0.31			
W08	0.315	0.344		0.329	0.32			
	0.329	0.345						
	0.329	0.331						
	0.317	0.32						
	0.316	0.333						



## Reliability Tests

Item	Condition	Note	Failures
Life Test	$T_a = RT, I_F = 20mA$	1000hrs	0/22
IR Reflow	$T_s = 255 \pm 5^\circ C$	3 time	0/22
Thermal Shock	$T_a = -40^\circ C (15min) \sim 100^\circ (15min)$ (Transfer time < 10sec)	200 cycles	0/22
Temperature Cycle	$T_a = -40^\circ C (30min) \sim 100^\circ (30min)$ (Transfer time < 15min)	200 cycles	0/22
Low Temperature Operating	$T_a = -30^\circ C, I_F = 20mA$	1000hrs	0/22
High Temperature Storage	$T_a = 100^\circ C$	1000hrs	0/22
Low Temperature Storage	$T_a = -40^\circ C$	1000hrs	0/22
Temperature Humidity Storage	$T_a = 85^\circ C, RH = 85\%$	1000hrs	0/22
Temperature Humidity Operating	$T_a = 85^\circ C, RH = 85\%, I_F = 10mA$	1000hrs	0/22

### < Judging Criteria For Reliability Tests >

VF	USL[1] X 1.2
IR	USL X 2.0
$\phi V$	LSL [2] X 0.5

Notes :

[1] USL : Upper Standard Level

[2] LSL : Lower Standard Level.

## Forward Current Characteristics, $T_j=25^\circ\text{C}$

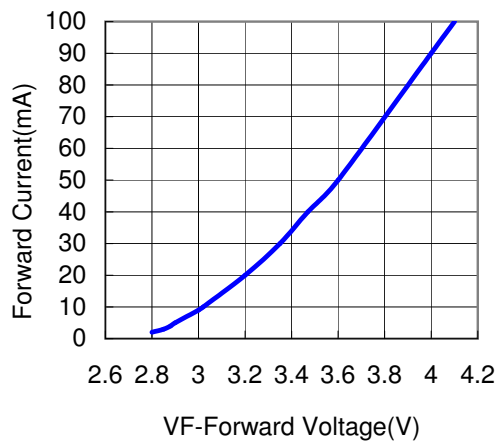


Fig 1. Forward Current vs. Forward Voltage

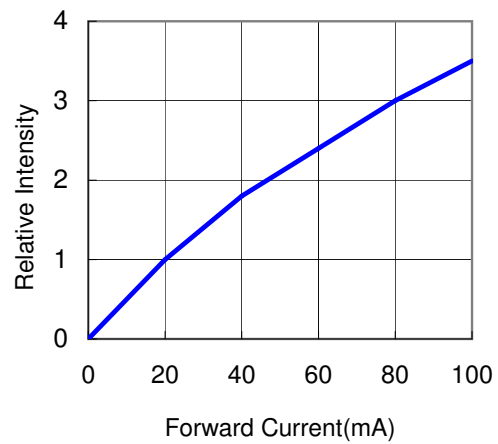


Fig 2. Relative Intensity vs. Forward Current

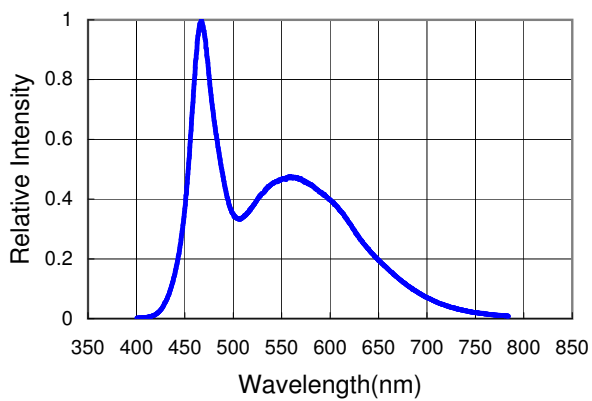


Figure 3. Relative Intensity vs. Wavelength

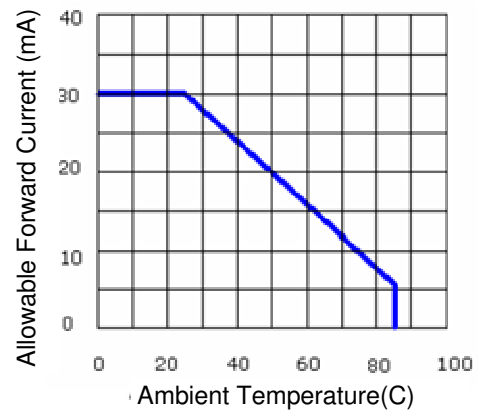


Figure 4. Ambient Temp & Forward Current

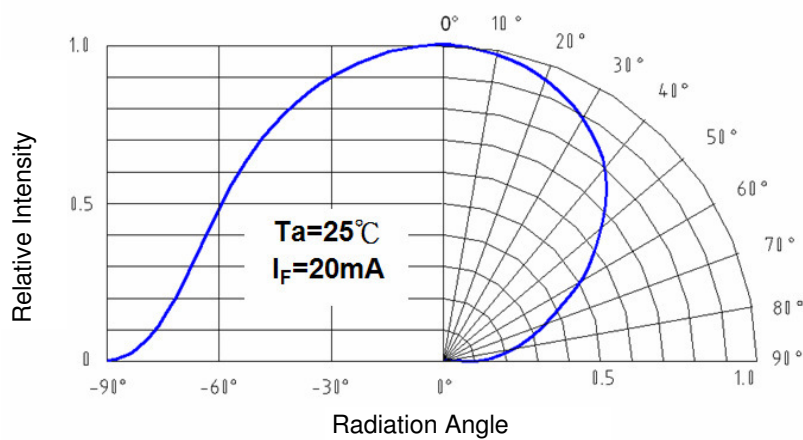
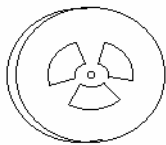
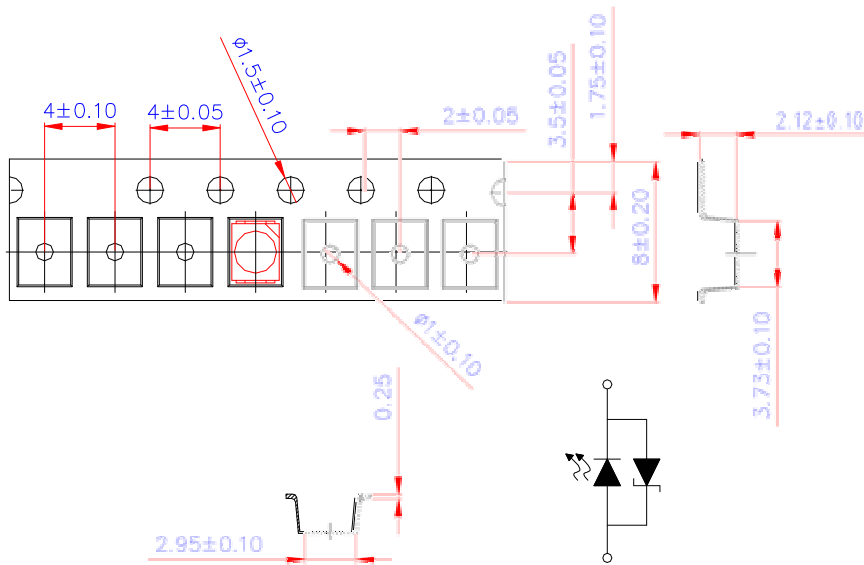
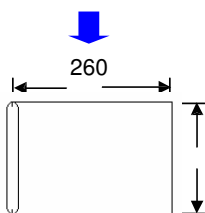


Figure 5. Beam Pattern Diagram

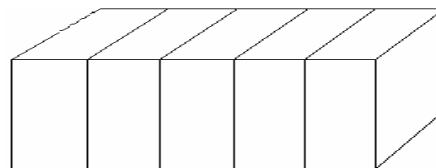
## Taping And Packing



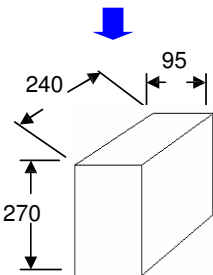
Diameter : 180 mm  
 Width : 8.4 mm  
 3528  $\Rightarrow$  2000 pcs/Reel Anti-Static Shielding Black Reel



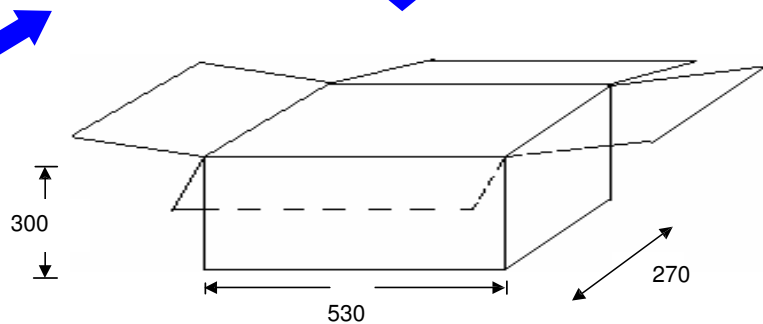
Anti-Static Shielding  
 1 Reel / Bag ( T = 0.1 mm )



5 Inner Box/1 Carton  
 3528  $\Rightarrow$  60000 pcs/ 1Carton



6 Bags / 1 Inner Box  
 3528  $\Rightarrow$  12000 pcs/ 1 Inner Box



## Recommend IR Reflow Condition

Reflow Soldering		
	Lead Solder	Lead-free Solder
Pre-heat	120~150°C	180~200°C
Pre-heat time	120 sec. Max.	120 sec. Max.
Peak temperature	240°C Max.	260°C Max.
Soldering time	10 sec. Max.	10 sec. Max.
Condition	refer to temperature-profile (A)	refer to temperature-profile (B) (N <sub>2</sub> reflow is recommended.)

- After reflow soldering rapid cooling should be avoided.

## Temperature-profile ( Surface of MCPCB)

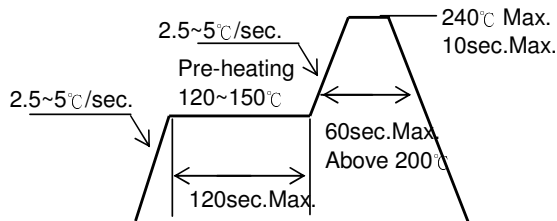


Figure 8a. Lead Solder Temperature Profile

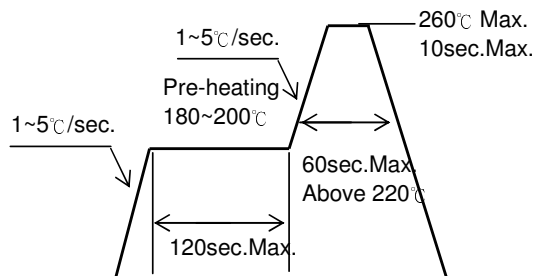


Figure 8b. Lead-free Solder Temperature Profile

- Occasionally there is a brightness decrease caused by the influence of heat or ambient during air reflow. It is recommended that the User use the nitrogen reflow method.
- Repairing should not be done after the LEDs have been soldered.
- Reflow soldering should not be done more than two times.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.



**Caution:**

1. After open the package, the LED should be kept at 30°C, 60%RH or less. The LED should be soldered within 168 hours (7 days) after opening the package.
2. Heat generation must be taken into design consideration when using the LED.
3. Power must be applied resistors for protection, over current would be caused the optic damage to the devices and wavelength shift.
4. Manual tip solder may cause the damage to Chip devices, so advised that heat of iron should be lower than 15W with temperature control under 5 seconds at 230-260 deg. C.  
( The device would be got damage in reworking process, recommended under 5 seconds at 230-260 deg. C)
5. All equipments and machinery must be properly grounded. It is recommended to use a wristband or anti-electrostatic glove when handing the LED.
6. Use IPA as a solvent for cleaning the LED. The other solvent may dissolve the LED package and the epoxy, Ultrasonic cleaning should not be done.
7. Damaged LED will show unusual characteristics such as leak current remarkably increases, turn-on voltage becomes lower and the LED gets unlight at low current.

**NOTE.**

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## JEDEC Information

JEDEC is used to determine what classification level should be used for initial reliability qualification. Once identified, the LEDs can be properly packaged, stored and handled to avoid subsequent thermal and mechanical damage during the assembly solder attachment and/or repair operation. The present moisture sensitivity standard contains six levels, the lower the level, the longer the devices floor life.

PLCC 5050 series are certified at level 2a. This means PLCC 5050 series have a floor life of 4 weeks before PLCC 5050 series need to re-baked.

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Condition	Time (hours)	Condition	Time (hours)	Condition
1	Unlimited	$\leq 30^{\circ}\text{C}/85\% \text{ RH}$	168 +5/-0	$85^{\circ}\text{C}/85\% \text{ RH}$		
2	1 year	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	168 +5/-0	$85^{\circ}\text{C}/60\% \text{ RH}$		
2a	4 weeks	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	696(1) +5/-0	$30^{\circ}\text{C}/60\% \text{ RH}$	120 +1/-0	$60^{\circ}\text{C}/60\% \text{ RH}$
3	168 hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	192(1) +5/-0	$30^{\circ}\text{C}/60\% \text{ RH}$	40 +5/-0	$60^{\circ}\text{C}/60\% \text{ RH}$
4	72 hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	96(1) +5/-0	$30^{\circ}\text{C}/60\% \text{ RH}$	20 +5/-0	$60^{\circ}\text{C}/60\% \text{ RH}$
5	48 hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	72(1) +5/-0	$30^{\circ}\text{C}/60\% \text{ RH}$	15 +5/-0	$60^{\circ}\text{C}/60\% \text{ RH}$
5a	24 hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	48(1) +5/-0	$30^{\circ}\text{C}/60\% \text{ RH}$	10 +5/-0	$60^{\circ}\text{C}/60\% \text{ RH}$
6	Time on label (TOL)	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$	TOL	$30^{\circ}\text{C}/60\% \text{ RH}$		

Note:

(1)The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag, and includes maximum time allowed out of the bag at the distributor's facility.