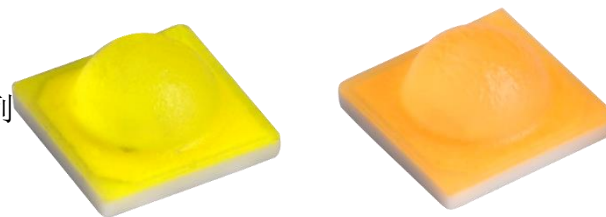


- . One of the best Lm/W, Lm/\$ in Mid-Power LED (高光效、高性价比)
- . HIGH-POWER CERAMIC PACKAGING LED – 3535 1W SERIES (LED-3535 1W系列)



T19\*\*\*11A-\*\*AA(COOL, NEUTRAL, WARM)



## Product Brief (产品简介)

### FEATURES AND BENEFITS (特性优点)

- . HIGH LUMEN OUTPUT AND EFFICACY (高流明和高光效)
- . DESIGNED FOR HIGH CURRENT OPERATION (高电流使用)
- . LOW THERMAL RESISTANCE (低热阻)
- . COOL WHITE EFFICACY OF UP TO 160 LM/W (@ 25°C, 350MA)  
(冷白光效可达160LM/W)
- . WIDE CCT RANGE 2600~7000K (色温范围: 2600~7000K)
- . HIGH COLOR QUALITY WITH CRI MIN. 70 (RA≥70)
- . PB-FREE REFLOW SOLDERING APPLICATION (适用无铅回流焊)

### KEY APPLICATIONS (应用)

- INDOOR LIGHTING (室内照明)
- OUTDOOR LIGHTING (户外照明)
- AUTOMOTIVE (汽车应用)
- ARCHITECTURAL LIGHTING (建筑照明)
- INDUSTRIAL LIGHTING (HIGH/LOW BAY) (工业照明)
- PORTABLE TORCH (便携式手电筒)
- HOME APPLIANCE (家用电器)

## Table 1. Product Selection Table (产品目录)

Model No. 型号	Color 颜色	CCT (色温)		
		Min.(最小值)	Typ. (典型值)	Max. (最大值)
T1965*11A-**AA	Cool White (冷白)	6020K	6530K	7040K
T1961*11A-**AA	Cool White (冷白)	5700K	6100K	6500K
T1957*11A-**AA	Cool White (冷白)	5310K	5665K	6020K
T1950*11A-**AA	Neutral White (正白)	4745K	5028K	5311K
T1940*11A-**AA	Neutral White (正白)	3710K	3985K	4260K
T1930*11A-**AA	Warm White (暖白)	2870K	3045K	3220K
T1927*11A-**AA	Warm White (暖白)	2580K	2725K	2870K

## Performance Characteristics (特性参数)

Table 2. Electro Optical Characteristics (光电特性),  $I_F = 350\text{mA}$ ,  $T_a = 25^\circ\text{C}$ , RH60%

Color Temperature 色温	Color Rendering 显指	Typical Luminous Flux ( $I_F=350\text{mA}$ ) 光通量典型值
	Min 最小值	
2725 ± 145K	70	140
3045 ± 175K	70	150
3985 ± 275K	70	161
5028 ± 283K	70	166
5665 ± 355K	70	161
6100 ± 400K	70	161
6530 ± 510K	70	161

- Tolerance of measurements of the Luminous Flux is  $\pm 7\%$ (LM测试误差 $\pm 7\%$ ) .
- Ra measurement tolerance is  $\pm 2$  (Ra测试误差 $\pm 2$ ) .
- Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram (CCT参考CIE 1931色度图) .
- The lumen table is only for reference (LM参数供参考) .
- $T_a = 25^\circ\text{C}$ , RH60% (温度:  $25^\circ\text{C}$ , 湿度: 60%) .

## Performance Characteristics (特性参数)

Table 3. Electro Optical Characteristics (光电特性) , IF = 350mA , Ta = 25°C , RH60%

Item 参数	Symbol 符号	Value 数值			Unit 单位	Test Condition 测试条件
		Min 最小值	Typ 典型值	Max 最大值		
Forward Voltage 正向电压	VF	2.8	3.2	3.4	V	IF=350mA
Reverse Current 反向电流	IR	-	-	10	μA	VR=5V
View Angle 发光角度	2θ1/2	-	120	-	°	IF=350mA
Thermal Resistance 热阻	(Rth <sub>j-sp</sub> )	-	2.75	-	°C/W	IF=350mA
Electrostatic Discharge 抗静电	ESD	1000	-	-	V	-

- Tolerance : VF : ±0.1V (VF测试误差±0.1V) .
- 2θ1/2 is the off-axis where the luminous intensity is 1/2 of the peak intensity (2θ1/2即为发光强度为峰值强度1/2的角度) .
- Thermal resistance : RthJS (Junction / solder) 热阻值 (结点至焊点) .
- Ta = 25°C, RH60% (温度: 25°C, 湿度: 60%) .

## Performance Characteristics (特性参数)

Table 4. Absolute Maximum Ratings (最大额定参数), Ta = 25°C, RH60%

Item 参数名称	Symbol 符号	Absolute Maximum Ratings 最大额定参数	Unit 单位
Forward Current 正向电流	IF	1000	mA
Pulse Forward Current 正向脉冲电流	IFP	1500	mA
Power Dissipation 功率损耗	PD	5000	mW
Reverse Voltage 反向电压	VR	5	V
Operating Temperature 操作温度	Topr	-40~+100	°C
Storage Temperature 储存温度	Tstg	-40~+100	°C
Junction Temperature 结温	Tj	125	°C
Soldering Temperature 回流温度	Tsld	230°C or 260°C for 10sec	

- IFP condition with Pulse: Width $\leq$ 100 $\mu$ s Duty cycle $\leq$ 1/10
- LED's properties might be different from suggested values like above and below tables if operation condition will be exceeded our parameter range. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
- 正向脉冲电流条件:脉冲宽度 $\leq$ 100 $\mu$ s, 占空比 $\leq$ 1/10
- 操作条件若超出最大额定参数, 可能会对LED造成不可预期伤害。

## Relative Spectral Distribution (光谱分布)

Fig 1. Color Spectrum (光谱图),  $T_a = 25^\circ\text{C}$ , RH60%

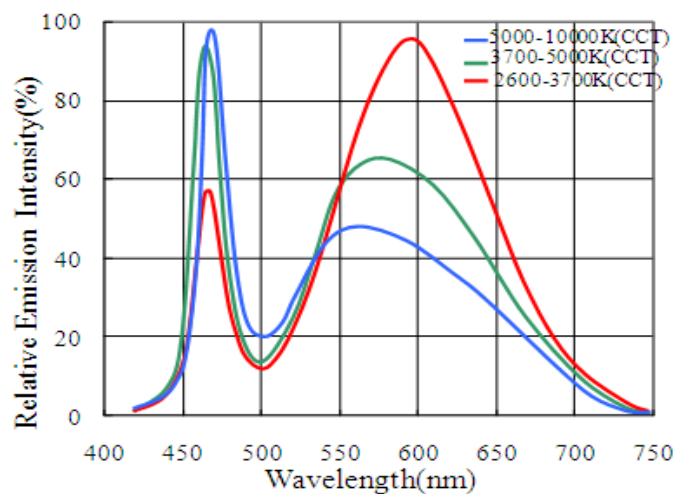
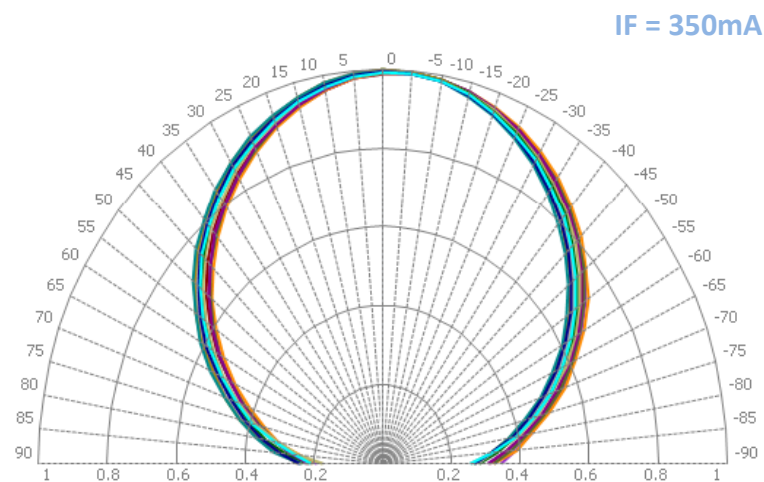


Fig 2. Viewing Angle Distribution (发光角度),  $T_a = 25^\circ\text{C}$ , RH60%



## Forward Current Characteristics (IV特性曲线)

Fig 3. IF--- Relative Luminous flux,  $T_a = 25^\circ\text{C}$   
(亮度与电流关系, 温度=25 $^\circ\text{C}$ )

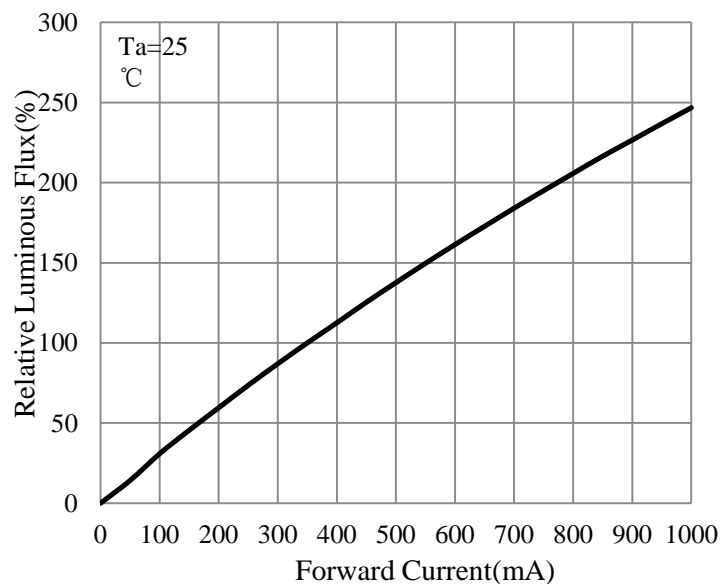
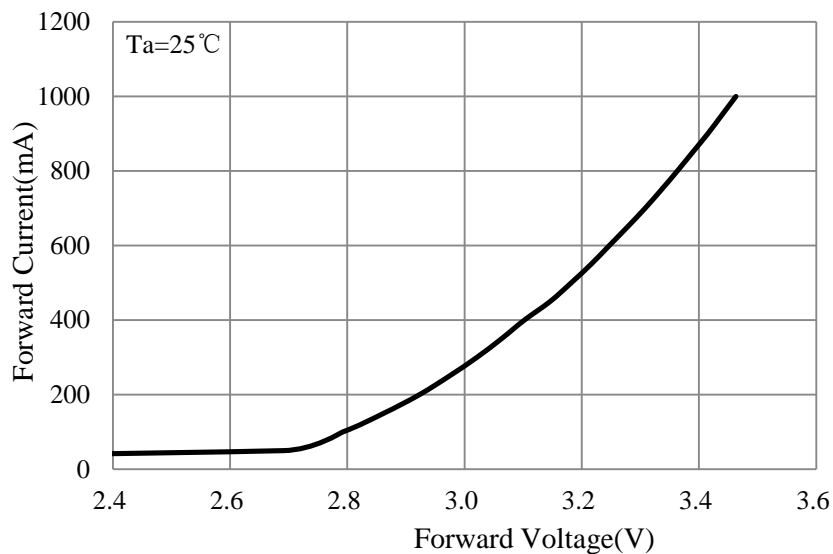
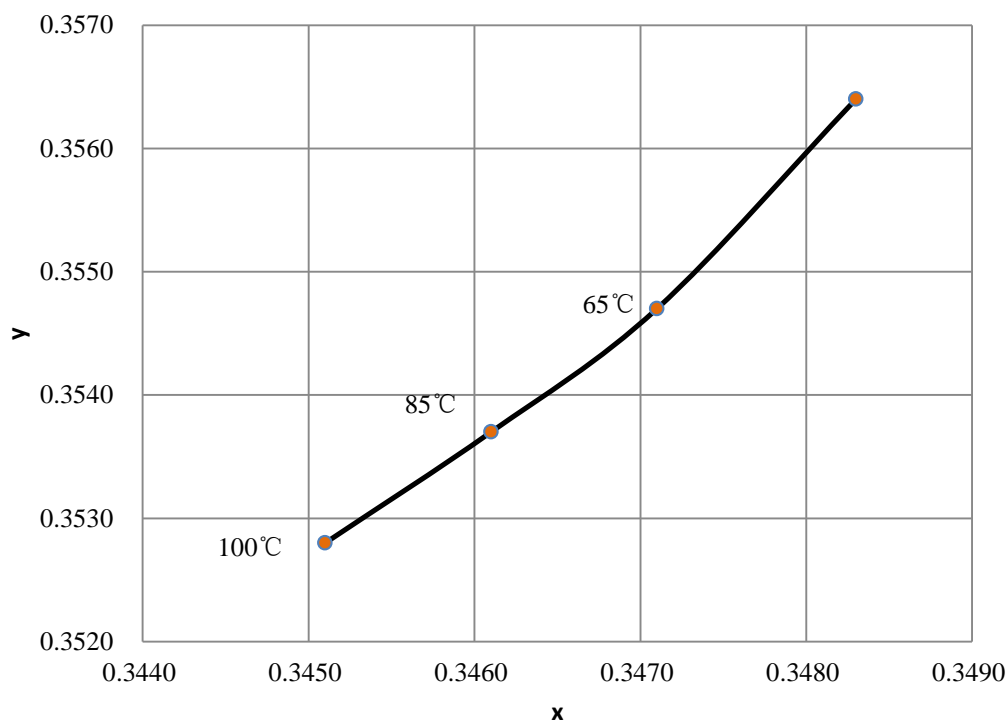


Fig 4. Forward Voltage vs. Forward Current,  $T_a = 25^\circ\text{C}$   
(电压与电流关系, 温度=25 $^\circ\text{C}$ )



## Ta vs. CIE x, y Shift (温度漂移曲线)

Fig 5. Ta vs. CIE x, y Shift (温度与CIE x, y 关系)



## Iv & Vf VS Temperature Characteristics (亮度与电压 vs 温度关系)

Fig 6. Ta—Relative Luminous flux (温度与亮度关系)

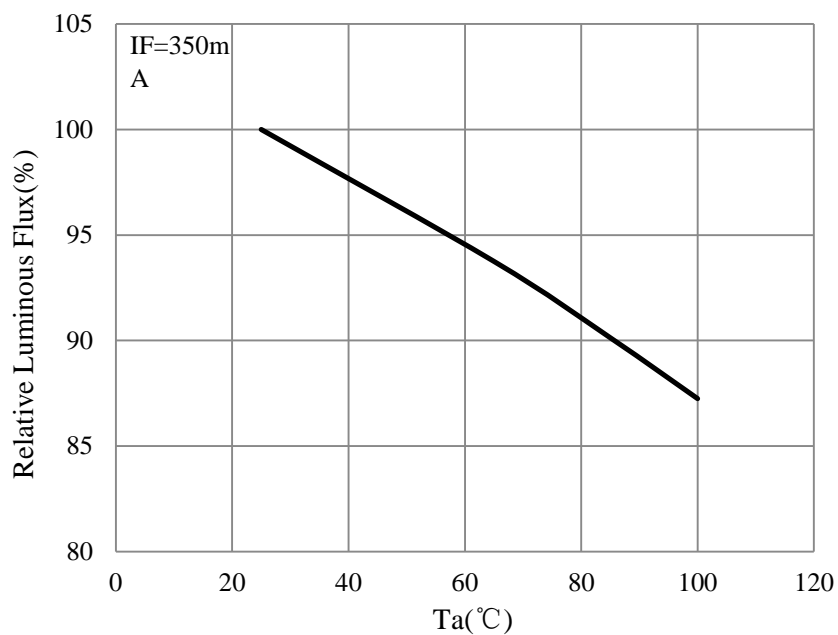
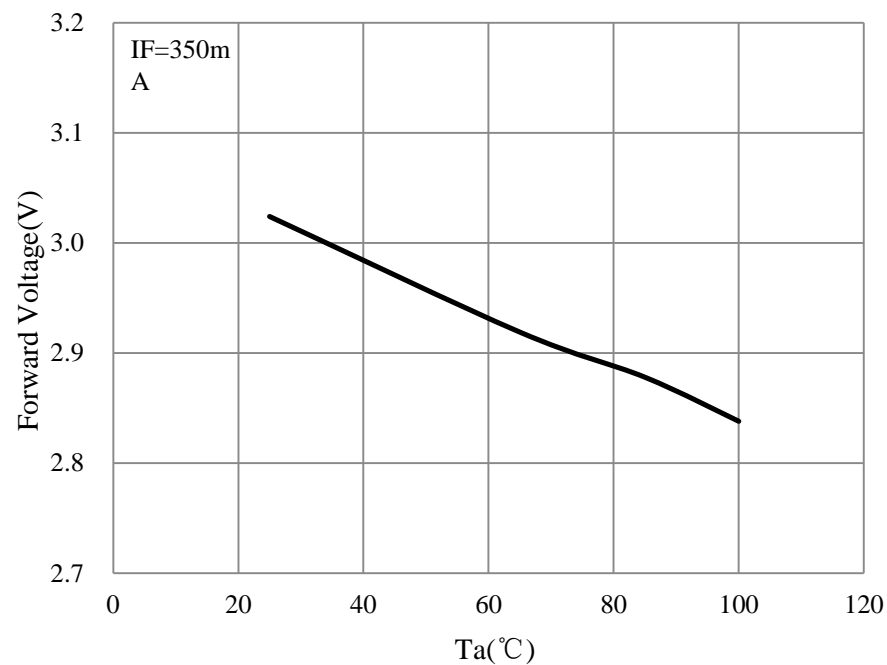


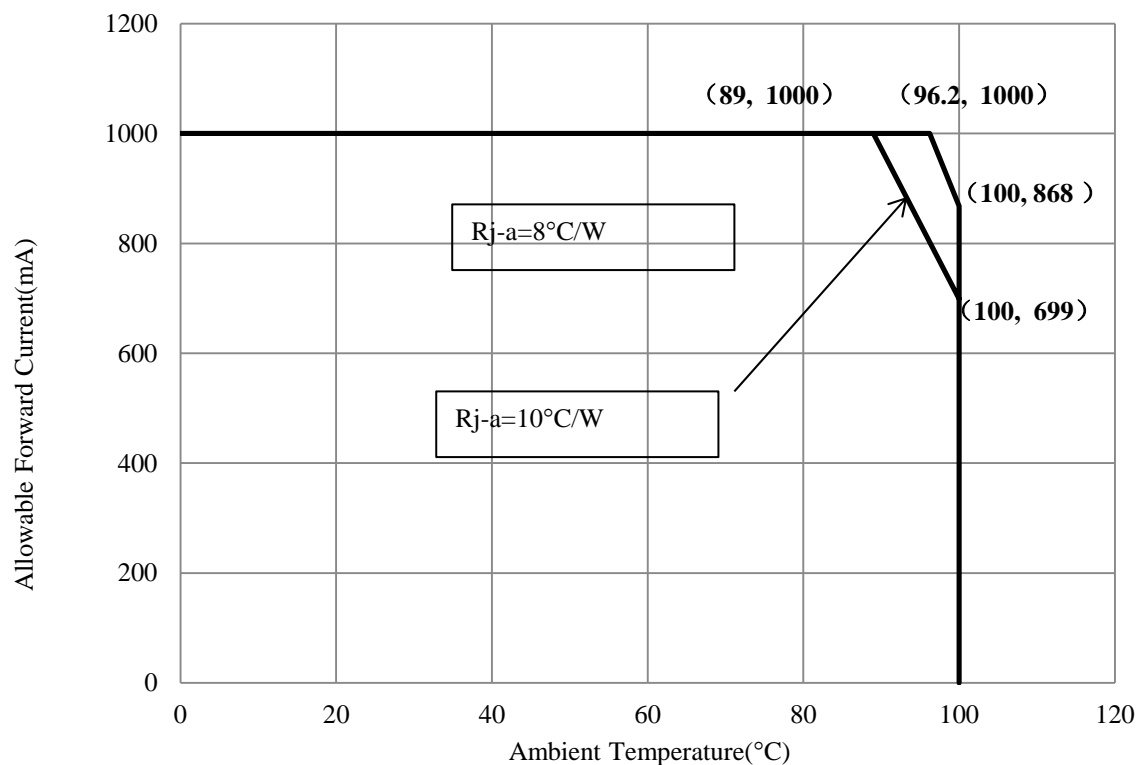
Fig 7. Ta—Forward Voltage (温度与电压关系)





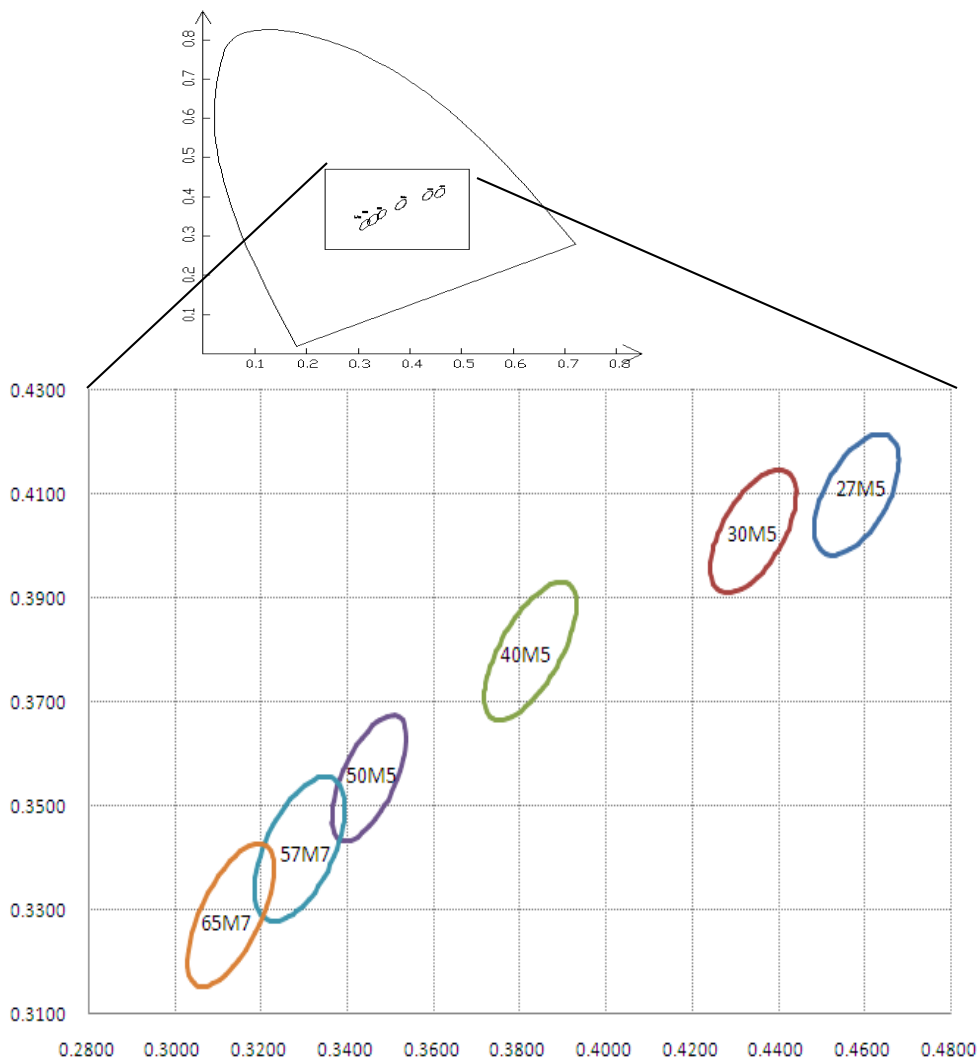
## Ambient Temperature Characteristics (电流温度关系特性)

Fig 8, Maximum Forward Current vs. Ambient Temperature (最大正向电流vs环境温度)



## Color Bin Structure (分色方式)

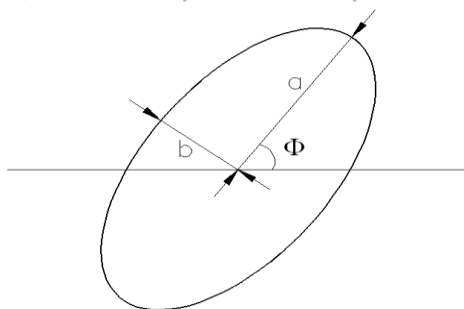
Fig 9, CIE Chromaticity Diagram (CIE色区图), IF = 350mA, Ta = 25°C



- All measurements were made under the standardized environment of Lightning LED.
- In order to ensure availability, single color rank will not be orderable.
- 所有测量都在天电标准环境下进行.
- 为了确保可用性, 单一颜色的排名不会订购.

## Color Bin Structure (分色方式)

Table 5. Bin Code description (分光色区图),  $I_F = 350\text{mA}$ ,  $T_a = 25^\circ\text{C}$ ,  $\text{RH}60\%$



Color Code 色区代码	Center 色区中心点		Radius 半径		Angle(角度)
	x	y	a	b	$\Phi$
27M5	0.4582	0.4099	0.013500	0.00700	53.42
30M5	0.4342	0.4028	0.013900	0.00680	53.13
40M5	0.3825	0.3798	0.015650	0.00670	53.43
50M5	0.3451	0.3554	0.013700	0.00590	59.37
57M7	0.3290	0.3417	0.015645	0.00770	58.35
65M7	0.3130	0.3290	0.015610	0.006650	58.34

- Energy Star binning applied to all 2600~7000K (所有2600~7000K分色方式参照能源之星定义)
- Measurement Uncertainty of the Color Coordinates :  $\pm 0.007$  (色坐标的测试误差: $\pm 0.007$ )
- $T_a = 25^\circ\text{C}$ ,  $\text{RH}60\%$  (温度:  $25^\circ\text{C}$ , 湿度: 60%) .

## Luminous Flux Bin Structure(分光方式)

Table 6. Luminous Flux Ranks (光通量分档), IF = 350mA, Ta = 25°C, RH60%

Color Temperature 色温	Color Rendering 显指		Luminous Flux 光通量 (IF=350mA)		
	Min 最小值	Typ 典型值	Code 代码	Min 最小值	Max 最大值
2725 ± 145K	70	72	2F	130	139
			2G	139	148
			2H	148	156
3045 ± 175K	70	72	2G	139	148
			2H	148	156
			2J	156	164
3985 ± 275K	70	71	2H	148	156
			2J	156	164
			2K	164	172
5028 ± 283K	70	71	2H	148	156
			2J	156	164
			2K	164	172
5665 ± 355K	70	71	2H	148	156
			2J	156	164
			2K	164	172
6100 ± 400K	70	71	2H	148	156
			2J	156	164
			2K	164	172
6530 ± 510K	70	71	2H	148	156
			2J	156	164
			2K	164	172

- Tolerance of measurements of the Luminous Flux is ± 7% (光通量的测量误差: ± 7%)。
- Ra measurement tolerance is ± 2. (Ra 测量误差: ± 2)。
- Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram (相关色温来源于CIE 1931色度图)。
- Ta = 25°C, RH60% (温度: 25 °C, 湿度: 60%)。

## Forward Voltage Bin Structure (分压方式)

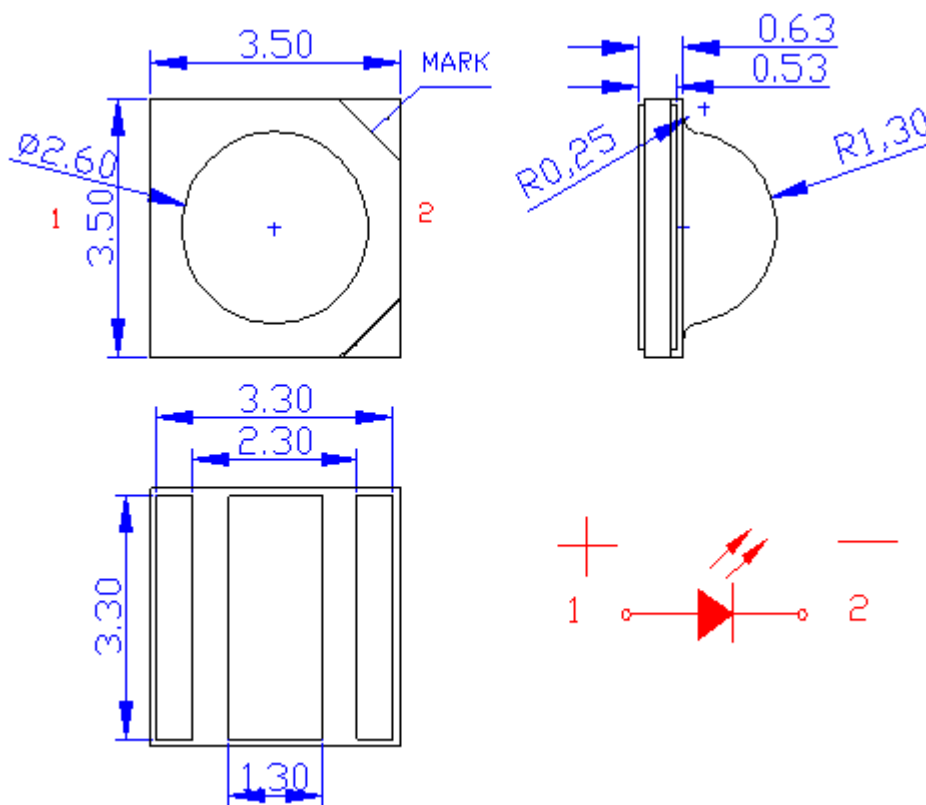
Table 7. Forward Voltage Ranks (正向电压分档) ,  $I_F = 350\text{mA}$  ,  $T_a = 25^\circ\text{C}$  ,  $\text{RH}60\%$

Code 代码	Min 最小值	Max 最大值	Unit 单位
B	2.8	2.9	V
C	2.9	3.0	V
D	3.0	3.1	V
E	3.1	3.2	V
F	3.2	3.3	V
G	3.3	3.4	V

- Tolerance of measurements of the Forward Voltage is  $\pm 0.1\text{V}$  (正向电压的测量误差:  $\pm 0.1\text{V}$ ).
- $T_a = 25^\circ\text{C}$  ,  $\text{RH}60\%$  (温度:  $25^\circ\text{C}$  , 湿度:  $60\%$ ) .

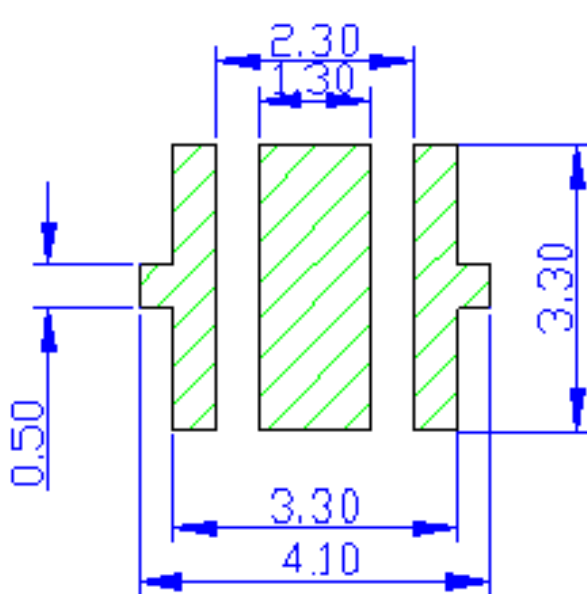
## Mechanical Dimensions (产品尺寸)

### Mechanical Dimensions (产品尺寸)



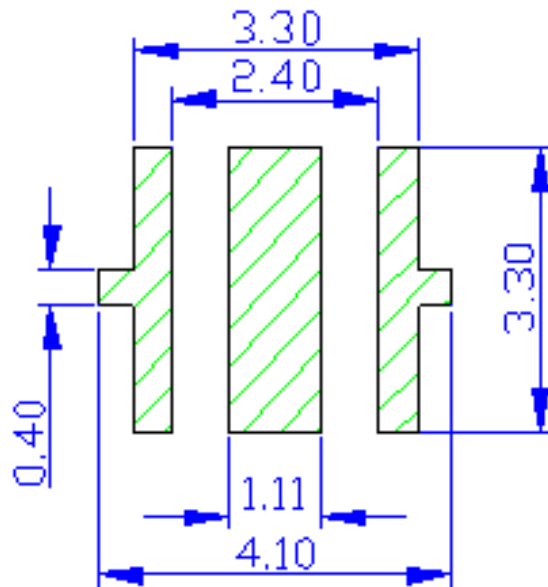
- All dimensions are in millimeters (图中所有尺寸均以毫米为单位) .
- Scale : 1:1 (比例: 1:1) .
- Undefined tolerance is  $\pm 0.2\text{mm}$  (尺寸公差:  $\pm 0.2$ 毫米).

## Recommended Solder Pad(焊盘设计)



**Recommended solder pad**

建议焊盘



**Recommended stencil opening**

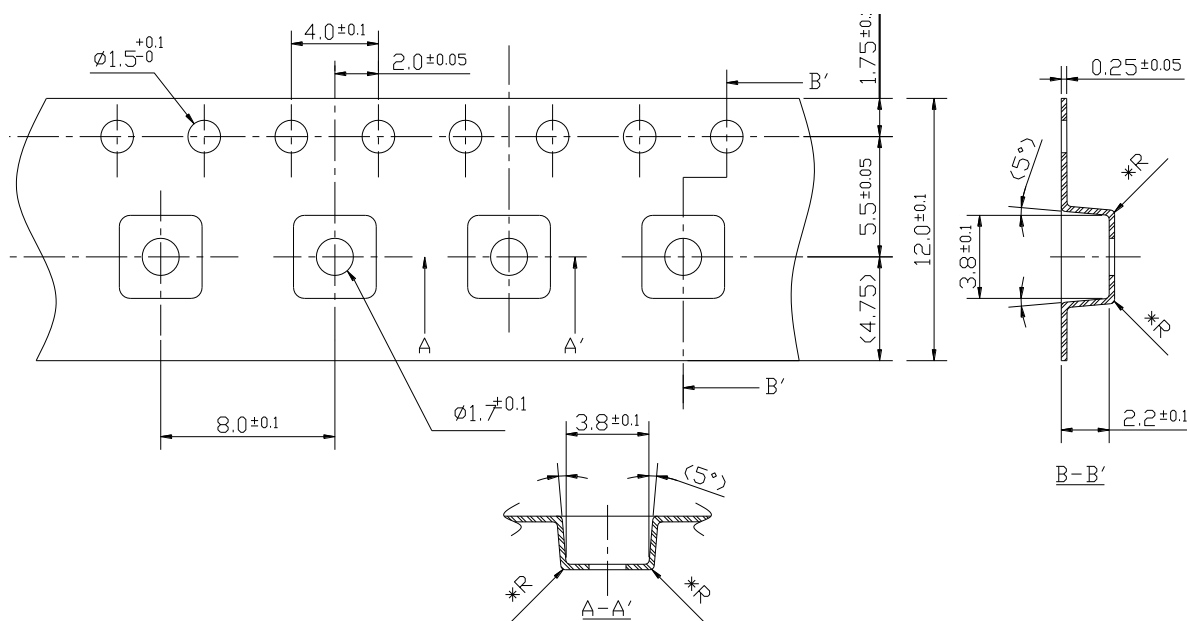
建议钢网

- All dimensions are in millimeters.
- Scale : 1:1
- This drawing without tolerances are for reference only
- Undefined tolerance:  $\pm 0.10\text{mm}$ .

- 图中所有尺寸均以毫米为单位.
- 比例: 1:1 .
- 图纸仅供参考.
- 若无特殊标注, 图中公差尺寸为 $\pm 0.10\text{mm}$ .

## Packaging Information (包装信息)

### Reel Packaging (卷带包装)

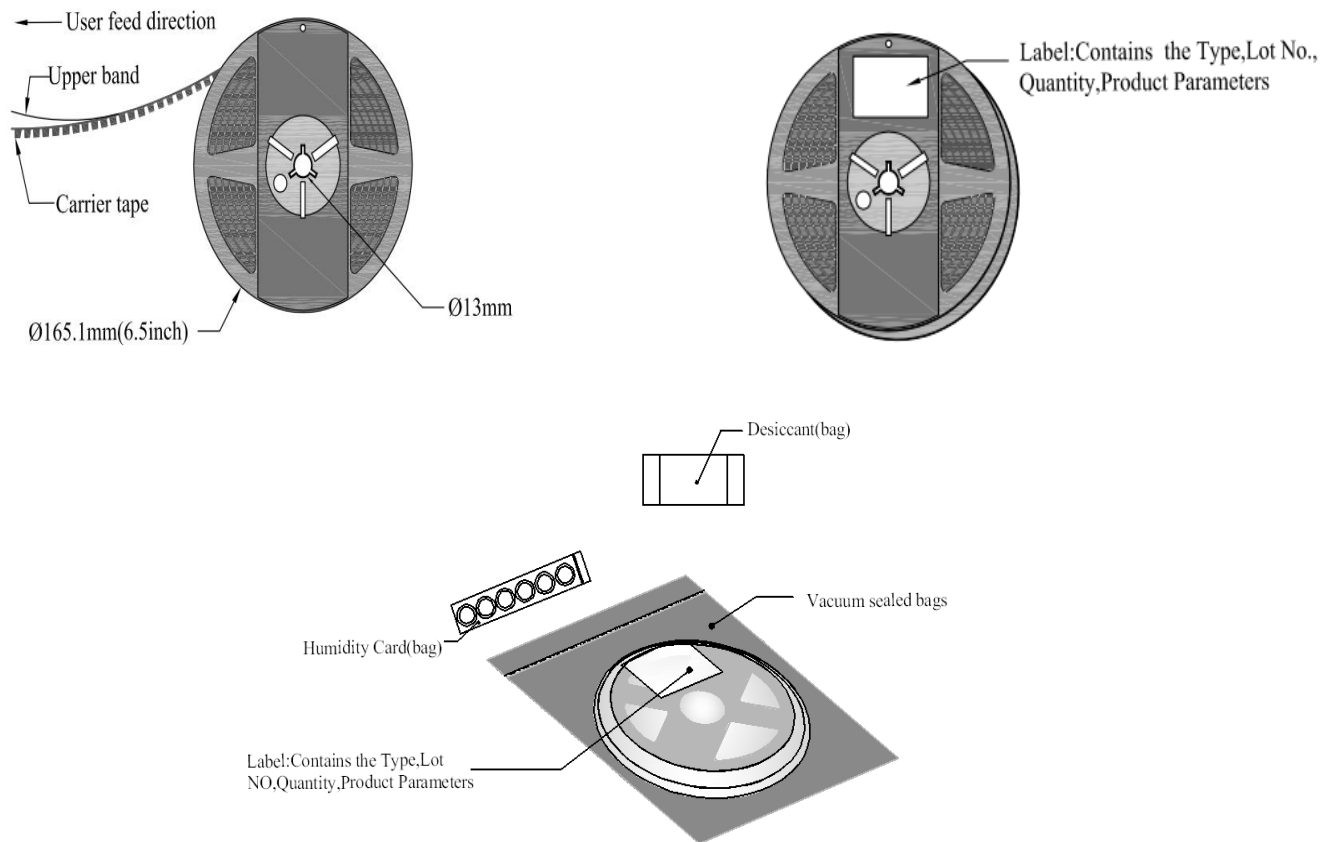


- Quantity : Max 1100pcs/Reel
- Cumulative Tolerance : Cumulative Tolerance/10 pitches to be  $\pm 0.25\text{mm}$
- Adhesion Strength of Cover Tape Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of  $10^\circ$  to the carrier tape.
- Package : P/N, Manufacturing data Code No. and Quantity to be indicated on a damp proof Package.
- 数量: 最多1100pcs/卷
- 10 pitches累积公差 :  $\pm 0.2\text{mm}$
- 上带剥离强度为0.1-0.7N (上带与载带成 $10^\circ$ 角剥离)
- 包装信息包含料号, 生产日期及数量等



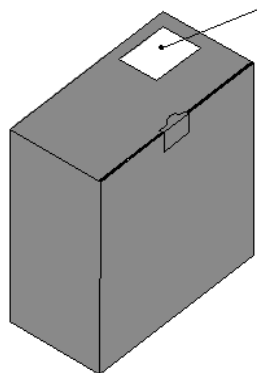
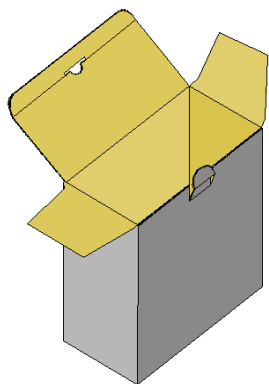
## Packaging Information (包装信息)

### Reel Packaging (卷带包装)



## Packaging Information (包装信息)

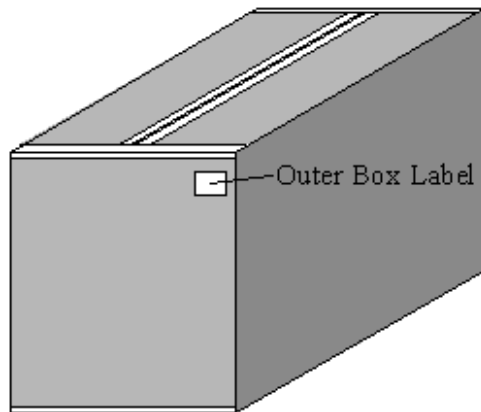
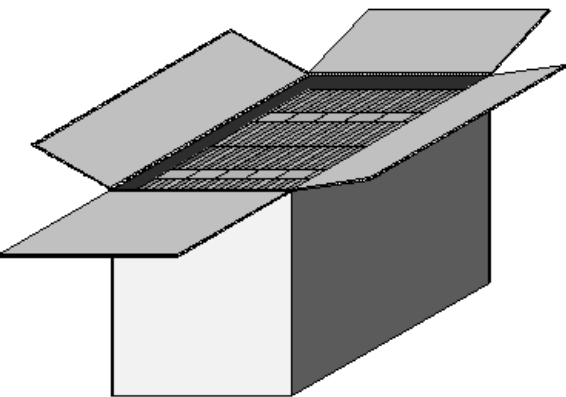
### Inner Box (内箱)



Label: Contains Type,  
Lot NO, Quantity, Product  
Parameters.

\* Capacity 5 or 10 reels per box (内箱容量: 5或10卷)

### Outer Box (外箱)



Outer Box Label

\* Capacity 30 or 60 reels per box (外箱容量: 30或60卷)

### Label (标签)

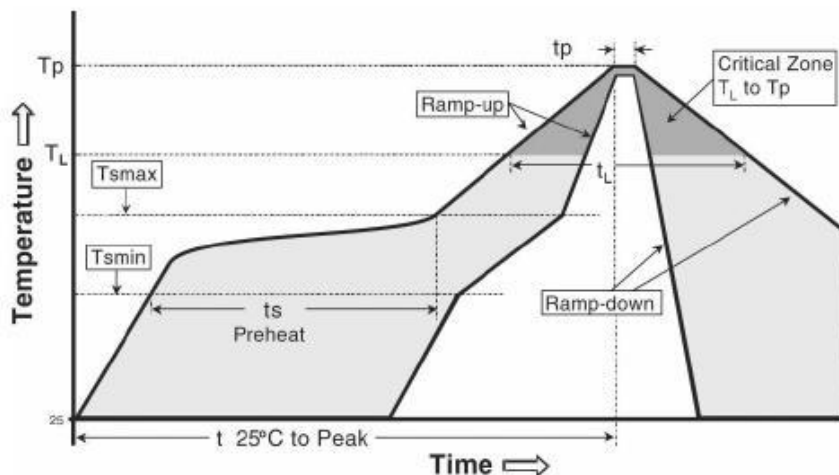
深圳市天电光电科技有限公司			
LIGHTNING OPTOELECTRONIC TECHNOLOGY(SZ)CO.,LTD			
产品型号Type:	T*****C-***AA		
项目Item:	Min	Max	Unit
电压 Vf@**mA:	**	**	V
光通量 Φ@**mA:	**	**	Lm
色区Color Bin@**mA:	**(*****)		
显指 Ra@**mA:	**(MIN)		
Lot No. :XXXXXX-XX	数量QTY: ****PCS		

## Product Nomenclature (命名原则)

Table 8. Part Numbering System(命名原则) : T  $\square\square$   $\square\square$   $\square$   $\square$   $\square$   $\square$  -  $\square\square$   $\square\square$   
 X1 X2 X3 X4 X5 X6 X7 X8

Item Number Code 序号代码	Description 描述	Content 内容
X1	Type code 产品代码	34:3020; 3A:K285; 3B:3014; 3C:3030; 5A:5050N; 32: 3528; 19: Ceramic 3535; 15: Ceramic 5050; 12: Ceramic 9292; 20: 2016.
X2	CCT code 色温代码	2725 ± 145K: 27 3045 ± 175K: 30 3985 ± 275K: 40 5028 ± 283K: 50 5665 ± 355K: 57 6530 ± 510K: 65
X3	Color Rendering 显指	Ra70: 7; Ra80: 8; Ra90: 9
X4	No. of serial chip 晶片串联数量	1-Z.
X5	No. of parallel chip 晶片并联数量	1-Z.
X6	Component code 补充码	A-Z
X7	Internal code1 内部码1	\
X8	Internal code2 内部码2	\

## Reflow Soldering Characteristics(建议回流焊方式)



Reflow soldering	
Temperature Min (T <sub>smin</sub> ) Temperature Max (T <sub>smax</sub> ) Time(ts)from ( T <sub>smin</sub> to T <sub>smax</sub> )	150 °C 200 °C 60-180 seconds.
Ramp-up rate (T <sub>L</sub> to T <sub>p</sub> )	3 °C/seconds max.
Liquidous temperature(T <sub>L</sub> ) Time(t <sub>L</sub> ) maintained above T <sub>L</sub>	217 °C 60-150 seconds
Peak package body temperature( T <sub>p</sub> )	260 °C max
Time (tp) within 5 °C of the specified classification temperature(T <sub>c</sub> ).	20-40 seconds max
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	6 °C/second max
Time 25 °C to peak temperature	8 min max

## Pre-caution for use (注意事项)

---

### Caution

- 1.Reflow soldering is recommended not to be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.
2. Repairs should not be done after the LEDs have been soldered. When repair is unavoidable, suitable tools must be used.
3. Die slug is to be soldered.
4. When soldering, do not put stress on the LEDs during heating.
5. After soldering, do not warp the circuit board.

### Notes on Lightning EMC Series soldering:

- 1.Recommend to use reflow machine.
- 2.Recommend to use heating plate soldering.
- 3.Manual soldering is not recommended.

### Notes on reflow process:

- 1.To confirm whether the actual temperature curve in the reflow soldering conditions comply with recommended conditions. LEDs are guaranteed for one time reflow.
- 2.During reflow process do not apply force on LED active area.
- 3.After reflow process, PCB board should be cooled down before packing or storage.

## Pre-caution for use (注意事项)

---

### 注意:

1. 回流焊建议不要超过两次.
2. LED焊接后不建议重工。当重工不可避免时,必须使用合适的工具.
3. 不可虚焊.
4. 焊接加热过程中,请勿施加压力于LED表面 .
5. 焊接后,请勿弯曲电路板.

### 焊接注意事项:

1. 建议使用回流焊机器。
2. 建议使用加热板焊接。
3. 不建议手动焊接。

### 回流焊注意事项:

1. 确保实际温度曲线与回流焊接条件相符合。
2. 在回流过程中, 请勿施加压力于LED表面。
3. 回流后,PCB板在包装或存储前需冷却至常温。

Revision record 修订记录				
DOC.NO 文件编号	Version 版本	Page 页数	Content of change 变更内容	Date 日期
SZTDPSA-014	A00	29	/	2014/7/30
SZTDPSA-010	A01	/	高光效产品，增加各色温段LM	2015/9/25
SZTDPSA-010	A01	/	修改曲线及LM，显指修正70	2015/10/12