SPECIFICATIONS FOR T20 SERIES

WHITE LED

Model：2016

Part No：T20**811A-M67**

Features:

* Top view white LED
* Thermally Enhanced Package Design
* High luminous flux output
* High current capability
* Compact Package Size
* Wide viewing angle
* Pb-free Reflow Soldering Application
* The product itself will remain within RoHS compliant version

Applications

* Interior lighting
* Retrofits (replacement)
* General lighting
* Architectural / Decorative lighting

Part Numbering System

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X1 X2 X3 X4 X5 X6 X7 X8 X9 X10

Item Number Code	Description	Content
X1	Type code	1S:1010; 1A:1919; 20:2016; 3B:3014; 28:2835 34:3020; 3C:3030; 5C:5050; 7C:7070; 1D:100100; 19:Ceramic 3535; 15:Ceramic 5050; 11:Ceramic 1616.
X2	CCT code	2700K:27; 3000K:30; 4000K:40; 5000K:50; 5700K:57; 6500K:65.
X3	Color Rendering	Ra70:7; Ra80:8; Ra90;9.
X4	No. of serial chip	1-Z.
X5	No. of parallel chip	1-Z.
X6	Component code	A-Z.
X7	Color Code	M:ANSI; F:ERP; R:85℃ ANSI; T:105℃ ANSI; B:Backlighting; Q:Others;AT:Tospo
X8	Internal code1	\
X9	Internal code2	\
X10	Spare code	\

Electro Optical Characteristics, IF = 60mA, Tj=25℃

CCT	Color Rendering	Luminous Flux	
	Min	Typ	Min
2700K	80	24.5	22
3000K	80	25.5	24
4000K	80	27.0	24
5000K	80	27.0	24
5700K	80	27.0	24
6500K	80	27.0	24

* Tolerance of measurements of the Luminous Flux is ±7%.

* Ra measurement tolerance is ±2.

Absolute Maximum Ratings at Tj=25℃

Item	Symbol	Absolute Maximum Rating	Unit
Forward current	IF	150	mA
Pulse Forward current	IFP	225	mA
Power Dissipation	PD	480	mW
Reverse Voltage	VR	5	V
Operating Temperature	Topr	-40～+105	℃
Storage Temperature	Tstg	-40～+85	℃
Junction Temperature	Tj	120	℃
Soldering Temperature	Tsld	Reflow Soldering：230℃ or 260℃ for 10sec	

* I_{FP} condition with Pulse: Width≤100μs, Duty cycle≤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.

* All measurements were made under the standardized environment of Lightning LED.

Electrical/Optical Characteristics at Tj=25℃

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward Voltage	V_F	-	2.9	3.2	V	IF=60mA
Reverse Current	I_R	-	-	10	μA	VR=5V
View Angle	$2\theta_{1/2}$	-	120	-	°	IF=60mA
Thermal resistance	(Rth_{j-sp})	-	38	-	℃/W	IF=60mA
Electrostatic Discharge	ESD	1000	-	-	V	HBM

* Tolerance of measurements of the Forward Voltage is ±0.1V.

* 2θ1/2 is the off-axis where the luminous intensity is 1/2 of the peak intensity.

* Rth j-sp is the thermal resistance from LED junction to solder point on MCPCB with electrical power.

Bin Structure

Luminous Flux Ranks, IF = 60mA, Tj =25℃

CCT	Color Rendering		Luminous Flux		
	Min	Typ	Code	Min	Max
2700K	80	82	1G	22	24
			1H	24	26
			1J	26	28
3000K	80	82	1H	24	26
			1J	26	28
			1K	28	30
4000K	80	82	1H	24	26
			1J	26	28
			1K	28	30
5000K	80	82	1H	24	26
			1J	26	28
			1K	28	30
5700K	80	82	1H	24	26
			1J	26	28
			1K	28	30
6500K	80	82	1H	24	26
			1J	26	28
			1K	28	30

* Tolerance of measurements of the Luminous Flux is ±7%.

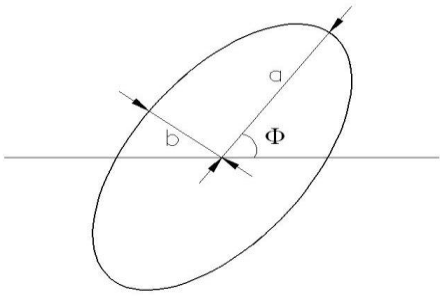
* Ra measurement tolerance is ±2.

Forward Voltage Ranks, IF = 60mA, Tj =25℃

Code	Min	Max	Unit
G3	2.6	2.8	V
H3	2.8	3.0	V
J3	3.0	3.2	V

* Tolerance of measurements of the Forward Voltage is ±0.1V.

CIE Chromaticity Diagram, IF = 60mA, Tj = 25℃



The color ranks have chromaticity ranges within 5-step MacAdam ellipse

Color Code	Center		Radius		Angle(deg)
	x	y	a	b	Φ
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
57M5	0.3290	0.3417	0.011175	0.00550	58.35
65M5	0.3130	0.3290	0.011150	0.00475	58.34

* Energy Star binning applied to all 2600~7000K.
* Tolerance of measurements of the chromaticity Coordinate is ±0.005.

Fig 1. Color Spectrum, Tj = 25℃

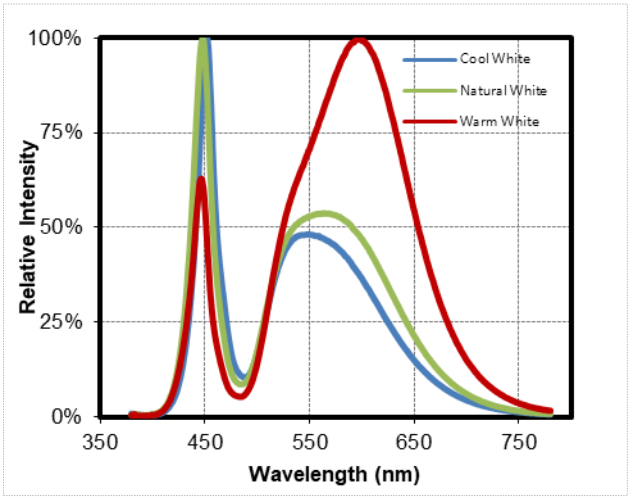


Fig 2. Viewing Angle Distribution, Tj = 25℃

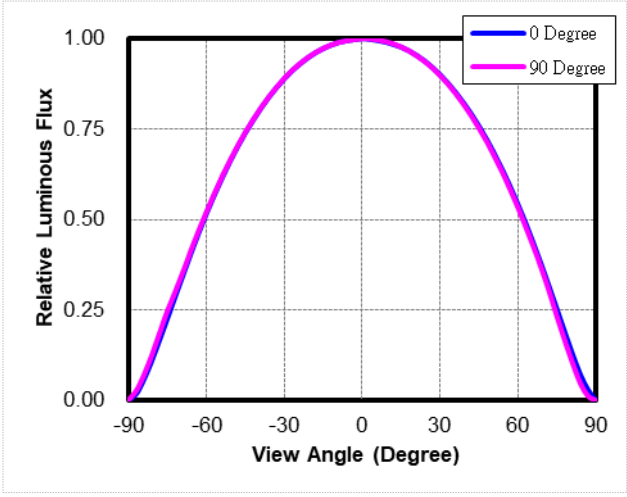


Fig 3. Forward Current vs. Relative Intensity, Tj = 25℃

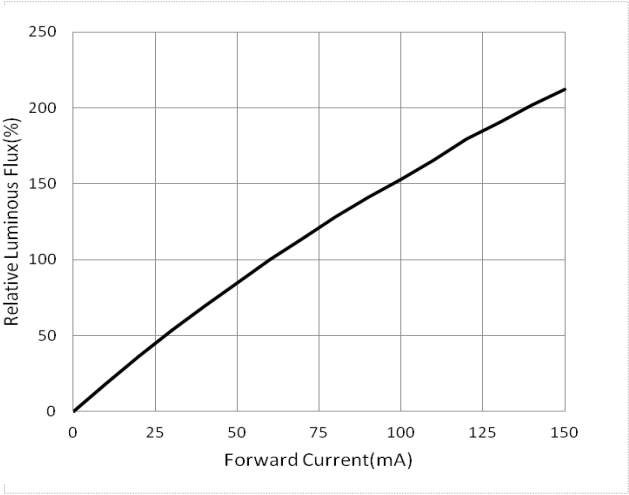


Fig 4. Forward Current vs. Forward Voltage, Tj = 25℃

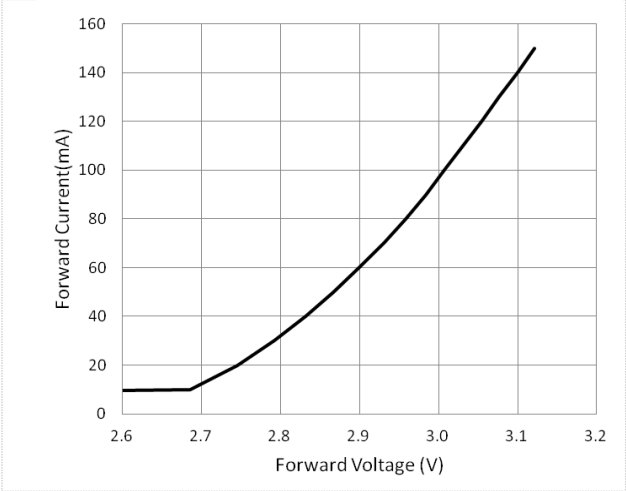


Fig 5. Ambient Temperature vs. Relative Luminous flux (IF=60mA)

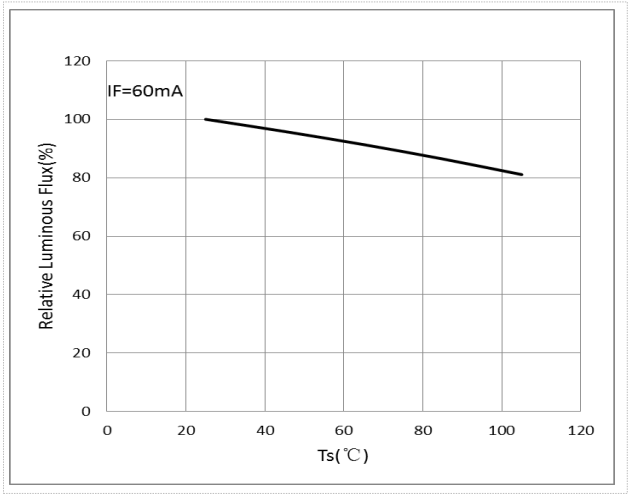


Fig 6. Ambient Temperature vs. Relative Forward Voltage (IF=60mA)

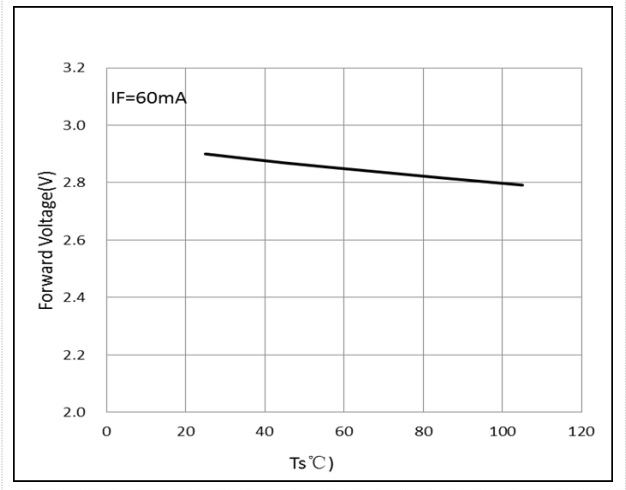


Fig 7. Chromaticity Coordinates vs. Ambient Temperature (IF=60mA)

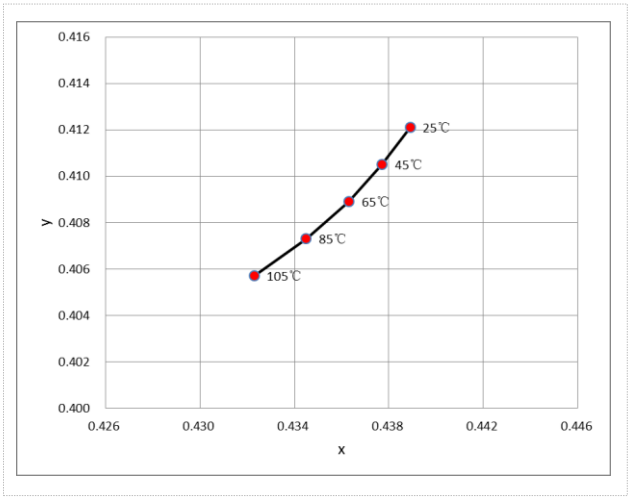
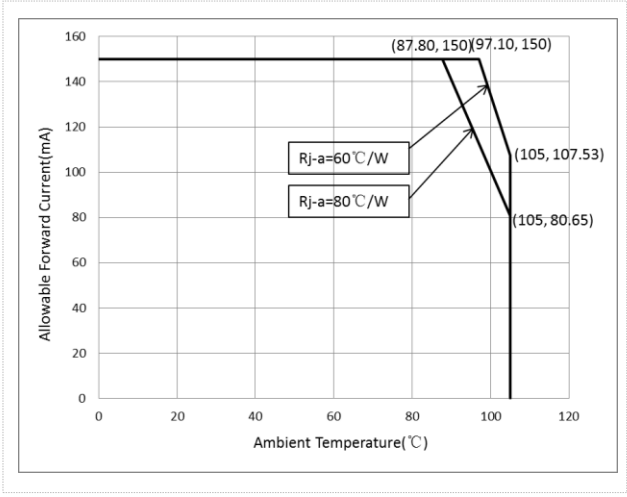
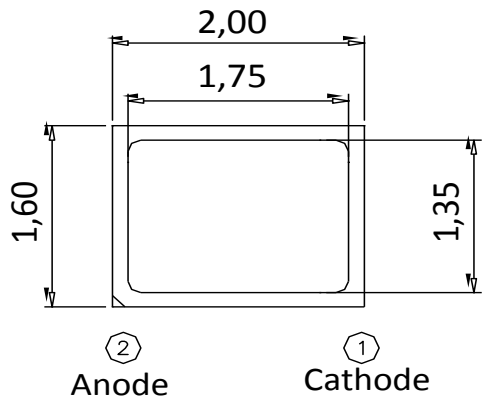
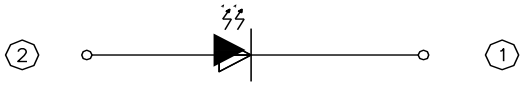


Fig 8. Allowable Forward Current De-rating Curve

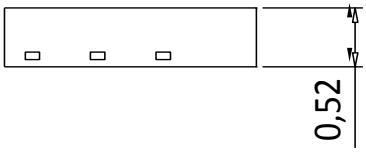


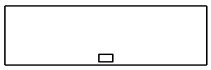
Package Dimensions

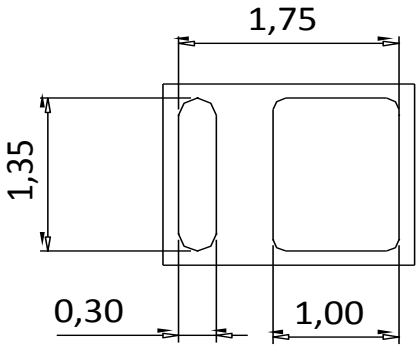




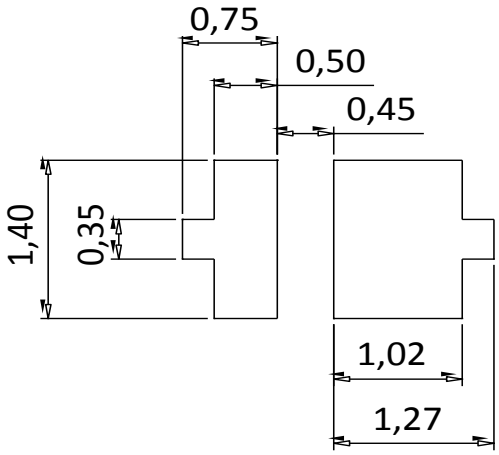
Polarity







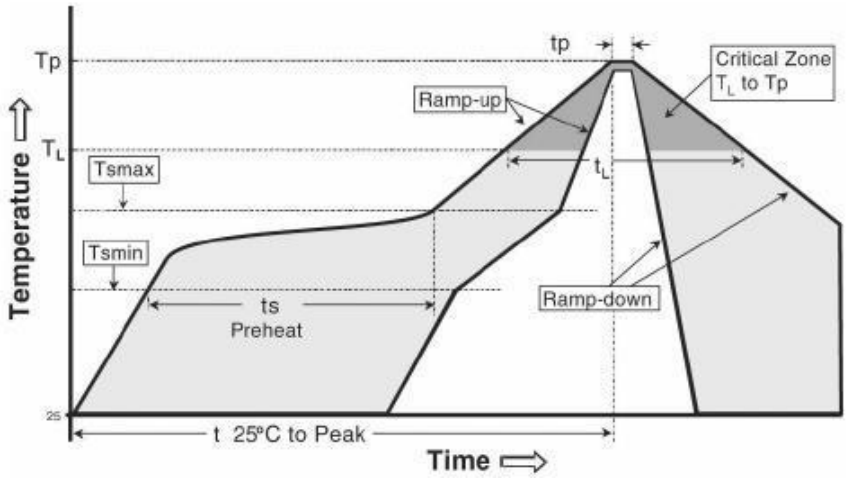
Bot. view



Soldering patterns

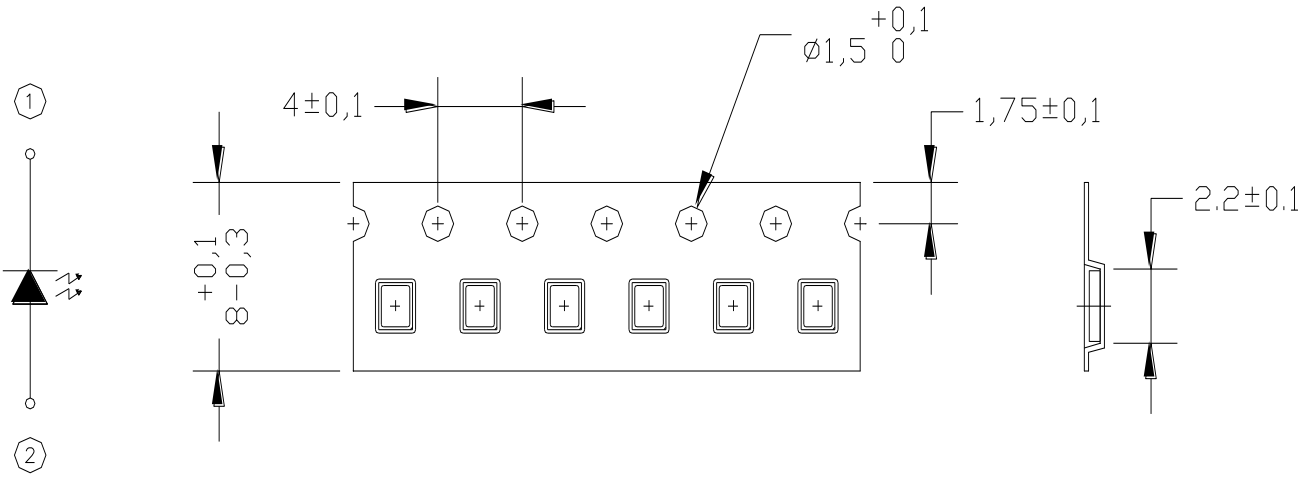
* The tolerance unless mentioned is ±0.1mm, unit = mm

Reflow Soldering Characteristics



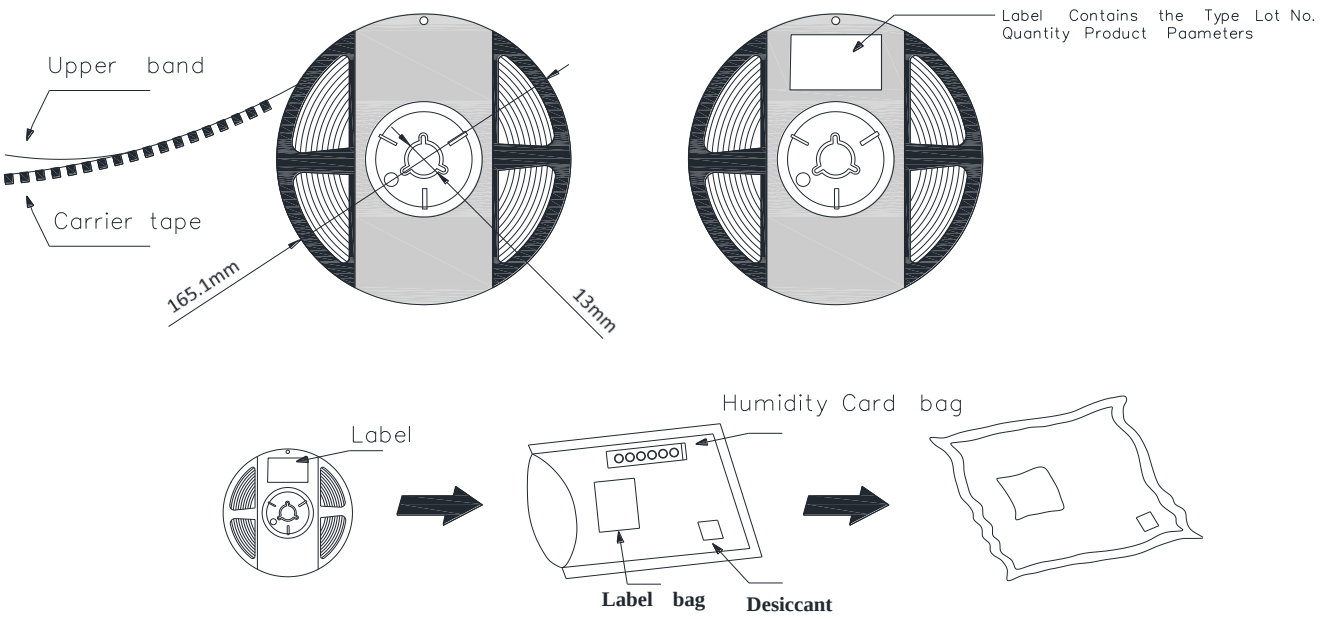
Reflow soldering	
Temperature Min (Tsmin) Temperature Max (Tsmax) Time(ts)from (Tsmin to Tsmax)	150° C 200° C 60-120 seconds.
Ramp-up rate (TL to Tp)	3° C/seconds max.
Liquidous temperature(TL) Time(tL) maintained above TL	217° C 60-150 seconds
Peak package body temperature(Tp)	260° C max
Time (tp) within 5° C of the specified classification temperature (Tc).	30 seconds max
Ramp-down rate (Tp to TL)	6° C/second max
Time 25 ° C to peak temperature	8 min max

Package Dimensions of Tape

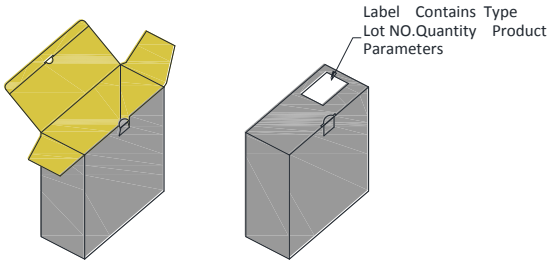


* Quantity : Max 5000pcs/Reel
* Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
* Package : P/N, Manufacturing data Code No. and Quantity to be indicated on a damp proof Package.
* unit = mm

Package Dimensions of Reel

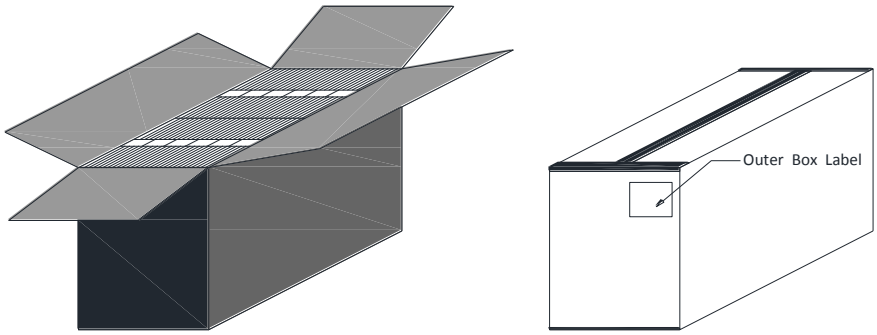


Package Box



* Capacity 10 reels per box.

Outer Box



* Capacity 30 or 60 reels per box.

Label

福建天电光电有限公司
FUJIAN LIGHTNING OPTOELEC TRONIC CO.LTD
型号Type: T********-*****
光通量Φ@ *** mA: *** - *** [LM]
色区Color Bin@*** mA: ****
电压Vf@ ***mA: ** - ** [V]
显指Ra@*** mA: ** (MIN)
Lot No.:A********- *- *******
Bin Code: **** 数量QTY:**** PCS

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.

Precaution for use

Storage

1.Before opening the package: The LED should be kept at 30℃ or less and 90%RH or less.

2.After opening the package: The LED's floor life is 168Hrs under 30℃ or less and 60%RH or less. If unused LED remain, it should be stored in moisture proof packages JEDEC (MSL 3).

3.If the moisture absorbent material(silica gel)has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions：

Baking treatment:60±5℃ for 24 hours.