

**Harvatek Surface Mount Chip LED Data Sheet  
HT-T5301 Series**

Official Product	Product: HT-T5301 Series			Data Sheet No.
Tentative Product	*****			HT-T5301 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		June 25, 2013	Version of 1.0	Page 1/21

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
  
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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### Product Specifications

	Specification	Material	Quantity
Iv	HT-T5301DNC: 16 - 23.5 lm @60mA 42 - 55lm @150mA HT-T5301DND: 16 - 23.5 lm @60mA 42 - 55lm @150mA / Ta=25 <sup>o</sup> C, ± 10%		
XY	Refer to Page 8-9 Ta=25 <sup>o</sup> C, ± 0.01		
Vf	3.4V max @30mA / Ta=25 <sup>o</sup> C, ± 0.05 V		
Resin	White	PPA	
Carrier tape	Per EIA 481-1A specs	Conductive black tape	2000pcs per reel
Reel	Per EIA 481-1A specs	Conductive black	
Label	HT standard	Paper	
Packing bag	220x240mm	Aluminum laminated bag/ no-zipper	One reel per bag
Carton	HT standard	Paper	

Others:

Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of Iv, λ<sub>D</sub> and Vf. Each reel has a label identifying its specification; the immediate box consists of a product label as well.

**ATTENTION: Electrostatic Discharge (ESD) protection**



The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlInGaP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD precaution must be taken during design and assembly.

If manual work or processing is needed, please ensure the device is adequately protected from ESD during the process.

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### Label Specifications

<b>HARVATEK</b> TECHNOLOGIES		Date: yyyy/mm/dd 
CUSTOMER P/N: 		
HARVATEK P/N: 	QTY: PCS 	
LOT NO: 	QC	
IV BIN: COLOR BIN: VF:		

### Harvatek P/N:

**H T - T 53 0 1 X X X - Y Y Y Y**



Series Name	Emitting Color	Customer Code
<b>HT-T5301</b>	<b>DNC-60: CRI&gt;70 @60mA</b>	<b>YYYY</b>
<b>HT: Harvatek</b>	<b>DND-60: CRI&gt;80 @60mA</b>	<b>Customer Product Code</b>
<b>T5301:</b>	<b>DNC-A2: CRI&gt;70 @150mA</b>	<b>(TBD)</b>
<b>5.7 (L) x 3.0 (W) x 0.9 (H) mm</b>	<b>DND-A2: CRI&gt;80 @150mA</b>	

### Lot No.:

1	2	3	4	5	6	7	8	9	10
<b>E</b>	<b>1</b>	<b>A</b>	<b>1</b>	<b>A</b>	<b>2</b>	<b>2</b>	<b>L</b>	<b>1</b>	<b>2</b>
Code 1 2		Code 3	Code 4	Code 5	Code 6	Code 7	Code 8	Code 9	Code 10
		Mfg. Year	Mfg. Month	Mfg. Date	Consecutive number		Special code		
Internal Tracing Code		2010-A 2011-B 2012-C 2013-D . .	1:Jan. 2:Feb. ... A:Oct. B:Nov. C:Dec.	1:A 2:B 3:C ... 26:Z 27:7 28:8 29:9 30:3 31:4	01~ZZ		000~ZZZ		

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■ Luminous Intensity (Iv) Bin:

Bin	Luminous Intensity Range (lm)	
	Minimum	Maximum
MD2	16.9	18.1
NA1	18.1	19.3
NB1	19.3	20.6
NC2	20.6	22.0
ND2	22.0	23.5

@60mA / Ta=25<sup>o</sup> C, Tolerance: ± 10%

Bin	Luminous Intensity Range (lm)	
	Minimum	Maximum
RB1	42.5	45.3
RC2	45.3	48.4
RD2	48.4	51.7
SA3	51.7	55.21

@150mA / Ta=25<sup>o</sup> C, Tolerance: ± 10%

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■ Forward Voltage ( $V_F$ ) Bin:

Color	Bin Code	Spec. Range
White (TW)	G4	2.7 – 2.8V
	H1	2.8 – 2.9V
	H2	2.9 – 3.0V
	H3	3.0 – 3.1V
	H4	3.1 – 3.2V
	J1	3.2 – 3.3V
	J2	3.3 – 3.4V

@60mA / Ta=25°C, Tolerance:  $\pm 0.05$  V

Color	Bin Code	Spec. Range
White (TW)	H1	2.8 – 2.9V
	H2	2.9 – 3.0V
	H3	3.0 – 3.1V
	H4	3.1 – 3.2V
	J1	3.2 – 3.3V
	J2	3.3 – 3.4V
	J3	3.4 – 3.5V

@150mA / Ta=25°C, Tolerance:  $\pm 0.05$  V

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600K-6250K																			
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y		
0.306	0.292	0.301	0.311	0.30975	0.2965	0.30955	0.3165	0.3035	0.3015	0.298	0.3225	0.307625	0.3065	0.303	0.3285	0.303	0.3285		
0.3035	0.3015	0.298	0.3225	0.307625	0.3065	0.303	0.3285	0.301	0.311	0.295	0.334	0.3055	0.3165	0.3005	0.3405	0.31	0.322	0.306	0.347
0.307625	0.3065	0.303	0.3285	0.31175	0.3115	0.308	0.3345	0.3055	0.3165	0.3005	0.3405	0.31	0.322	0.306	0.347				
0.30975	0.2965	0.3055	0.3165	0.3135	0.301	0.31	0.322	0.307625	0.3065	0.303	0.3285	0.31175	0.3115	0.308	0.3345				
0.306	0.292	0.301	0.311	0.30975	0.2965	0.30955	0.3165	0.3035	0.3015	0.298	0.3225	0.307625	0.3065	0.303	0.3285				

D0A	6500-6750K	D1A	6500-6750K	D0B	6250-6500K	D1B	6250-6500K	D0C	6500-6750K	D1C	6500-6750K	D0D	6250-6500K	D1D	6250-6500K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.3135	0.301	0.31	0.322	0.3167	0.304	0.3135	0.3255	0.31175	0.3115	0.308	0.3345	0.3151	0.31475	0.31175	0.33775
0.31175	0.3115	0.308	0.3345	0.3151	0.31475	0.31175	0.33775	0.31	0.322	0.306	0.347	0.3135	0.3255	0.31	0.35
0.3151	0.31475	0.31175	0.33775	0.3185	0.318	0.3155	0.341	0.3135	0.3255	0.31	0.35	0.317	0.329	0.314	0.353
0.3167	0.304	0.3135	0.3255	0.32	0.307	0.317	0.329	0.3151	0.31475	0.31175	0.33775	0.3185	0.318	0.3155	0.341
0.3135	0.301	0.31	0.322	0.3167	0.304	0.3135	0.3255	0.31175	0.3115	0.308	0.3345	0.3151	0.31475	0.31175	0.33775

E0A	6000K-6250K	E1A	6000K-6250K	E0B	5750-6000K	E1B	5750-6000K	E0C	6000K-6250K	E1C	6000K-6250K	E0D	5750-6000K	E1D	5750-6000K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.32	0.307	0.317	0.329	0.3235	0.31	0.3215	0.333	0.3185	0.318	0.3155	0.341	0.3225	0.3215	0.3205	0.34525
0.3185	0.318	0.3155	0.341	0.3225	0.3215	0.3205	0.34525	0.317	0.329	0.314	0.353	0.3215	0.333	0.3195	0.3575
0.3225	0.3215	0.3205	0.34525	0.3285	0.325	0.3255	0.3495	0.3215	0.333	0.3195	0.3575	0.326	0.337	0.325	0.362
0.3235	0.31	0.3215	0.333	0.327	0.313	0.326	0.337	0.3225	0.3215	0.3205	0.34525	0.3265	0.325	0.3255	0.3495
0.32	0.307	0.317	0.329	0.3235	0.31	0.3215	0.333	0.3185	0.318	0.3155	0.341	0.3225	0.3215	0.3205	0.34525

F0A	5500-5750K	F1A	5500-5750K	F0B	5250-5500K	F1B	5250-5500K	F0C	5500-5750K	F1C	5500-5750K	F0D	5250-5500K	F1D	5250-5500K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.327	0.313	0.326	0.337	0.332	0.317	0.3325	0.342	0.3265	0.325	0.3255	0.3495	0.33225	0.3295	0.33275	0.35475
0.3265	0.325	0.3255	0.3495	0.33225	0.3295	0.33275	0.35475	0.326	0.337	0.325	0.362	0.3325	0.342	0.333	0.3675
0.33225	0.3295	0.33275	0.35475	0.338	0.334	0.34	0.36	0.3325	0.342	0.333	0.3675	0.339	0.347	0.341	0.373
0.332	0.317	0.3325	0.342	0.337	0.321	0.339	0.347	0.33225	0.3295	0.33275	0.35475	0.338	0.334	0.34	0.36
0.327	0.313	0.326	0.337	0.332	0.317	0.3325	0.342	0.3265	0.325	0.3255	0.3495	0.33225	0.3295	0.33275	0.35475

G0A	5000K-5250K	G1A	5000K-5250K	G0B	4750-5000K	G1B	4750-5000K	G0C	5000K-5250K	G1C	5000K-5250K	G0D	4750-5000K	G1D	4750-5000K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.337	0.321	0.339	0.347	0.343	0.3255	0.346	0.351	0.338	0.334	0.34	0.36	0.3445	0.33825	0.3475	0.364
0.338	0.334	0.34	0.36	0.3445	0.33825	0.3475	0.364	0.339	0.347	0.341	0.373	0.346	0.351	0.349	0.377
0.3445	0.33825	0.3475	0.364	0.351	0.3425	0.355	0.368	0.346	0.351	0.349	0.377	0.353	0.355	0.357	0.381
0.343	0.3255	0.346	0.351	0.349	0.33	0.353	0.355	0.3445	0.33825	0.3475	0.364	0.351	0.3425	0.355	0.368
0.337	0.321	0.339	0.347	0.343	0.3255	0.346	0.351	0.338	0.334	0.34	0.36	0.3445	0.33825	0.3475	0.364

H0A	4500-4750K	H1A	4500-4750K	H0B	4250-4500K	H1B	4250-4500K	H0C	4500-4750K	H1C	4500-4750K	H0D	4250-4500K	H1D	4250-4500K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.349	0.33	0.353	0.355	0.3555	0.3335	0.36	0.359	0.351	0.3425	0.355	0.368	0.35775	0.34625	0.3625	0.37225
0.351	0.3425	0.355	0.368	0.35775	0.34625	0.3625	0.37225	0.353	0.355	0.357	0.381	0.36	0.359	0.365	0.3855
0.35775	0.34625	0.3625	0.37225	0.3645	0.35	0.37	0.3765	0.36	0.359	0.365	0.3855	0.367	0.363	0.373	0.39
0.3555	0.3335	0.36	0.359	0.362	0.337	0.367	0.363	0.35775	0.34625	0.3625	0.37225	0.3645	0.35	0.37	0.3765
0.349	0.33	0.353	0.355	0.3555	0.3335	0.36	0.359	0.351	0.3425	0.355	0.368	0.35775	0.34625	0.3625	0.37225

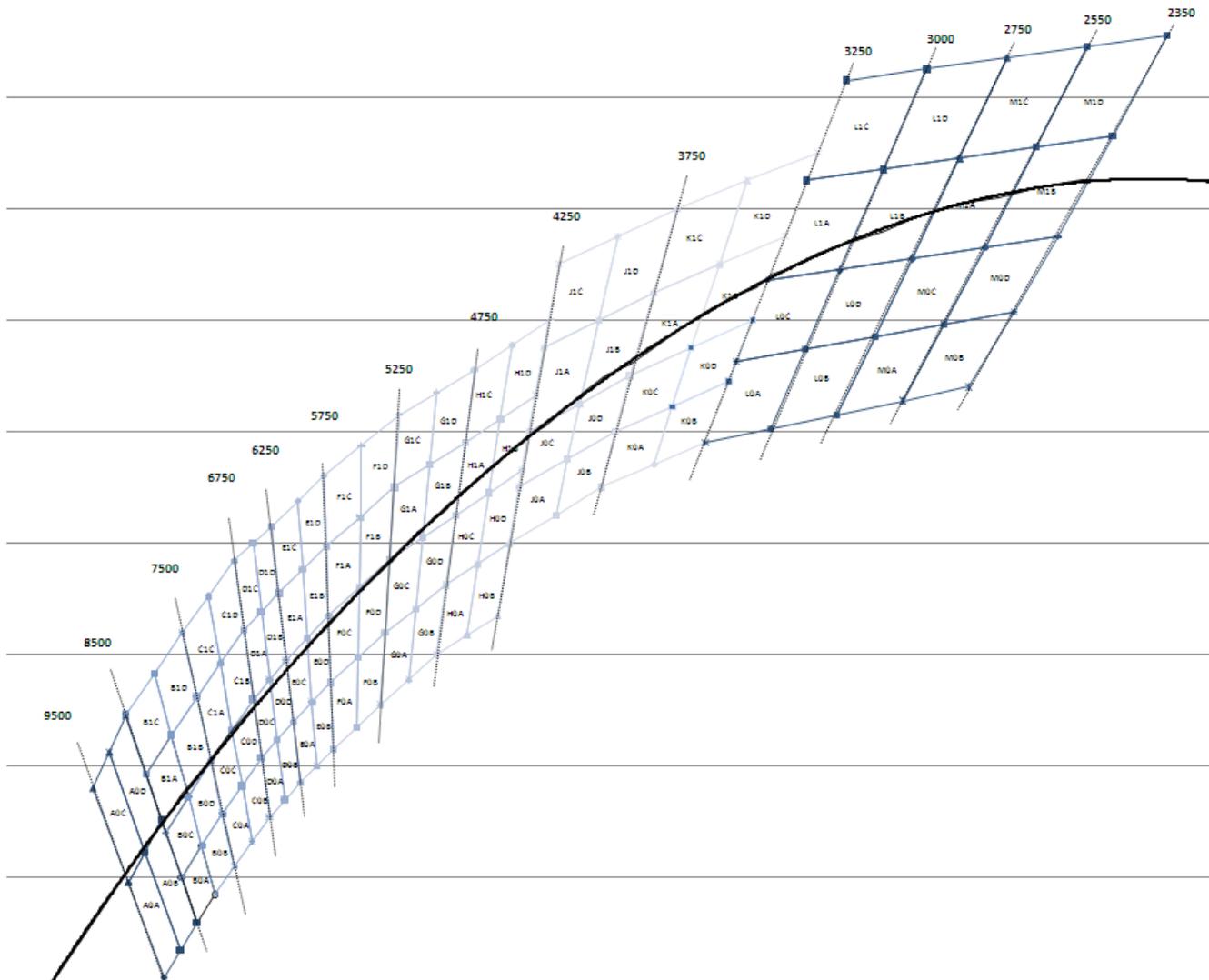
J0A	4000-4250K	J1A	4000-4250K	J0B	3750-4000K	J1B	3750-4000K	J0C	4000-4250K	J1C	4000-4250K	J0D	3750-4000K	J1D	3750-4000K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.3645	0.35	0.3685	0.37	0.37425	0.355	0.37925	0.375	0.3685	0.36	0.37175	0.365	0.37675	0.365	0.383375	0.39
0.3685	0.36	0.37175	0.365	0.37675	0.365	0.383375	0.39	0.3685	0.37	0.375	0.4	0.37925	0.375	0.3875	0.405
0.37675	0.365	0.383375	0.39	0.387	0.37	0.395	0.395	0.37925	0.375	0.3875	0.405	0.39	0.38	0.4	0.41
0.37425	0.355	0.37925	0.375	0.384	0.36	0.39	0.38	0.37675	0.365	0.383375	0.39	0.387	0.37	0.395	0.395
0.3645	0.35	0.3685	0.37	0.37425	0.355	0.37925	0.375	0.3685	0.36	0.37175	0.365	0.37675	0.365	0.383375	0.39

K0A	3500-3750K	K1A	3500-3750K	K0B	3250-3500K	K1B	3250-3500K	K0C	3500-3750K	K1C	3500-3750K	K0D	3250-3500K	K1D	3250-3500K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.384	0.36	0.39	0.38	0.395	0.364	0.403	0.385	0.387	0.37	0.395	0.395	0.399	0.3745	0.409	0.4
0.387	0.37	0.395	0.395	0.399	0.3745	0.409	0.4	0.39	0.38	0.4	0.41	0.403	0.385	0.415	0.415
0.399	0.3745	0.409	0.4	0.411	0.379	0.4228	0.4047	0.403	0.385	0.415	0.415	0.416	0.39	0.43	0.42
0.395	0.364	0.403	0.385	0.406	0.368	0.416	0.39	0.399	0.3745	0.409	0.4	0.411	0.379	0.423	0.405
0.384	0.36	0.39	0.38	0.395	0.364	0.403	0.385	0.387	0.37	0.395	0.395	0.399	0.3745	0.409	0.4

L0A	3000-3250K	L0B	2750-3000K	L0C	3000-3250K	L0D	2750-3000K	L1A	3000-3250K	L1B	2750-3250K	L1C	3000-3250K	L1D	2750-3000K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.40600	0.368	0.42000	0.37050	0.41250	0.38250	0.42725	0.38475	0.419	0.397	0.4345	0.399	0.42750	0.41500	0.44375	0.417
0.41250	0.38250	0.42725	0.38475	0.41900	0.39700	0.4345	0.399	0.42750	0.41500	0.44375	0.41700	0.43600	0.43300	0.45300	0.43500
0.42725	0.38475	0.44200	0.38700	0.43450	0.39900	0.45	0.401	0.44375	0.41700	0.46000	0.41900	0.45300	0.43500	0.47000	0.43700
0.42000	0.37050	0.43400	0.37300	0.42725	0.38475	0.442	0.387	0.43450	0.39900	0.45000	0.40100	0.44375	0.41700	0.46000	0.41900
0.40600	0.368	0.42000	0.37050	0.41250	0.38250	0.42725	0.38475	0.419	0.397	0.4345	0.399	0.42750	0.41500	0.44375	0.417

M0A	2550-2750K	M0B	2350-2550K	M0C	2550-2750K	M0D	2350-2550K	M1A	2550-2750K	M1B	2350-2550K	M1C	2550-2750K	M1D	2350-2550K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.434	0.373	0.448	0.3755	0.442	0.387	0.45675	0.38925	0.45	0.401	0.46550	0.40300	0.46000	0.41900	0.47625	0.421
0.44200	0.38700	0.45675	0.38925	0.45000	0.40100	0.46550	0.40300	0.46000	0.41900	0.47625	0.42100	0.47000	0.43700	0.48700	0.43900
0.45675	0.38925	0.47150	0.39150	0.46550	0.40300	0.48100	0.40500	0.47625	0.42100	0.49250	0.42300	0.48700	0.43900	0.50400	0.44100
0.44800	0.37550	0.46200	0.37800	0.45675	0.38925	0.47150	0.39150	0.46550	0.40300	0.48100	0.40500	0.47625	0.42100	0.	

**Color Temperature Coordinates**



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## Product Characteristics

### Absolute Maximum Ratings

Product	Emission Color	P <sub>d</sub> (mW)	I <sub>F</sub> (mA)	I <sub>FP</sub> * (mA)	I <sub>r</sub> (μA) @ V <sub>R</sub> = 5 V	T <sub>OP</sub> (°C)	T <sub>ST</sub> (°C)
HT-T5301DNC-60	White	585	60	60	<5	-30°C~+80°C	-40°C~+85°C
HT-T5301DND-60	White						
HT-T5301DNC-A2	White	585	150	300	<5	-30°C~+80°C	-40°C~+85°C
HT-T5301DND-A2	White						

\* Condition for I<sub>FP</sub> is pulse of 1/10 duty and 0.1msec width

\*\*Remarks: This product should be operated in forward bias. If a reverse voltage is continuously applied to the product, such operation can cause migration resulting in LED damage.

### Electro-Optical Characteristics

(T<sub>a</sub> 25 °C)

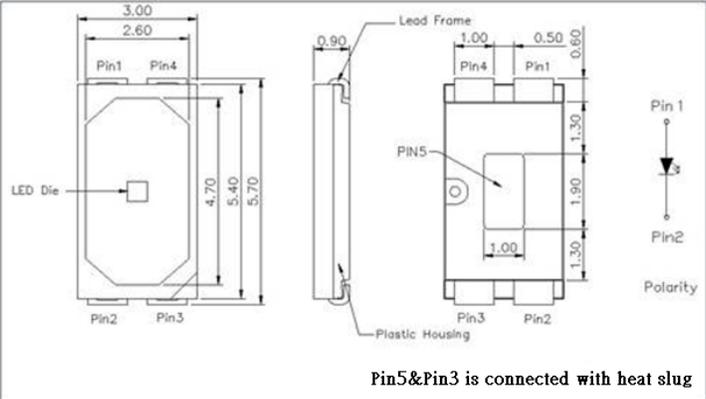
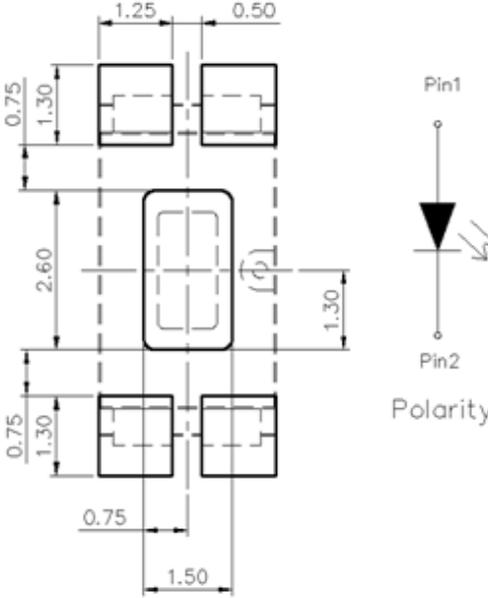
Product	Emission Color	I <sub>F</sub> (mA)	V <sub>F</sub> (V)		CCT Correlated Color Temperature(K)	I <sub>v</sub> (lm)
			typ	max		Typ
HT-T5301DNC-60	White	60	3.1	3.4	2750 - 7500	20
HT-T5301DND-60	White	60	3.1	3.4		20
HT-T5301DNC-A2	White	150	3.1	3.5	2750 - 7500	47
HT-T5301DND-A2	White	150	3.1	3.5		47

\* Per NIST standards

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**Package Outline Dimension  
Recommended Soldering Pattern for Reflow Soldering**

Unit: mm Tolerance: +/-0.1

Outline Dimension	Solder Pattern
 <p>Pin5&amp;Pin3 is connected with heat slug</p>	
<p>Soldering terminals may shift in the x, y direction.</p>	<p>Unit: mm</p>

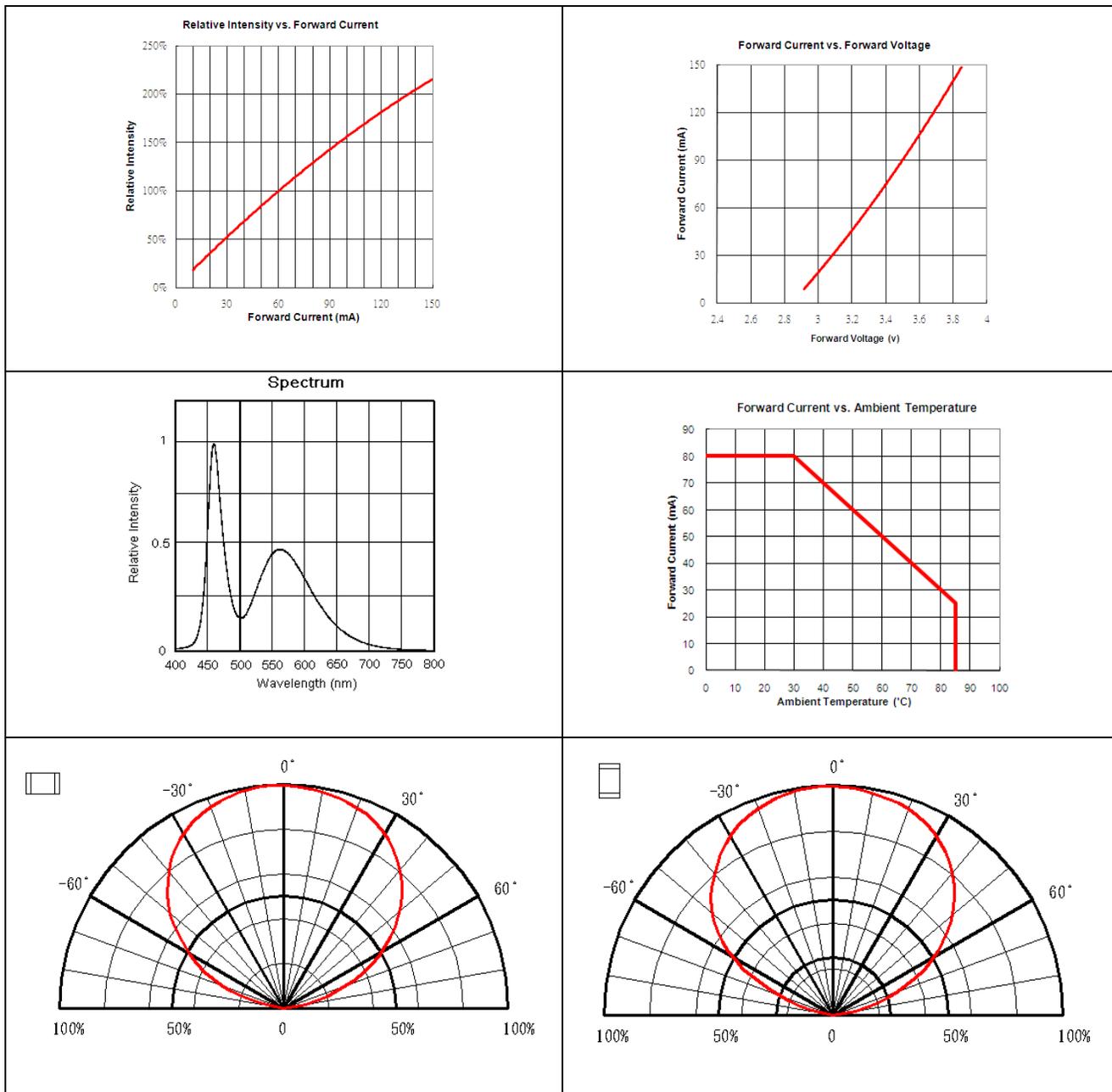
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## Precaution for Use

- 1) The chips should not be used directly in any type of fluid such as water, oil, organic solvent, etc.
- 2) When the LEDs are illuminating, the maximum ambient temperature should be first considered before operation.
- 3) LEDs must be stored in a clean environment. A sealed container with a nitrogen atmosphere is necessary if the storage period is over 3 months after shipping.
- 4) The LEDs must be used within seven days after unpacked. Unused products must be repacked in an anti-electrostatic package, folded to close any opening and then stored in a dry and cool space.
- 5) The appearance and specifications of the products may be modified for improvement without further notice.
- 6) The LEDs are sensitive to the static electricity and surge. It is strongly recommended to use a grounded wrist band and anti-electrostatic glove when handling the LEDs. If a voltage over the absolute maximum rating is applied to LEDs, it will damage LEDs. Damaged LEDs will show some abnormal characteristics such as remarkable increase of leak current, lower turn-on voltage and getting unlit at low current.

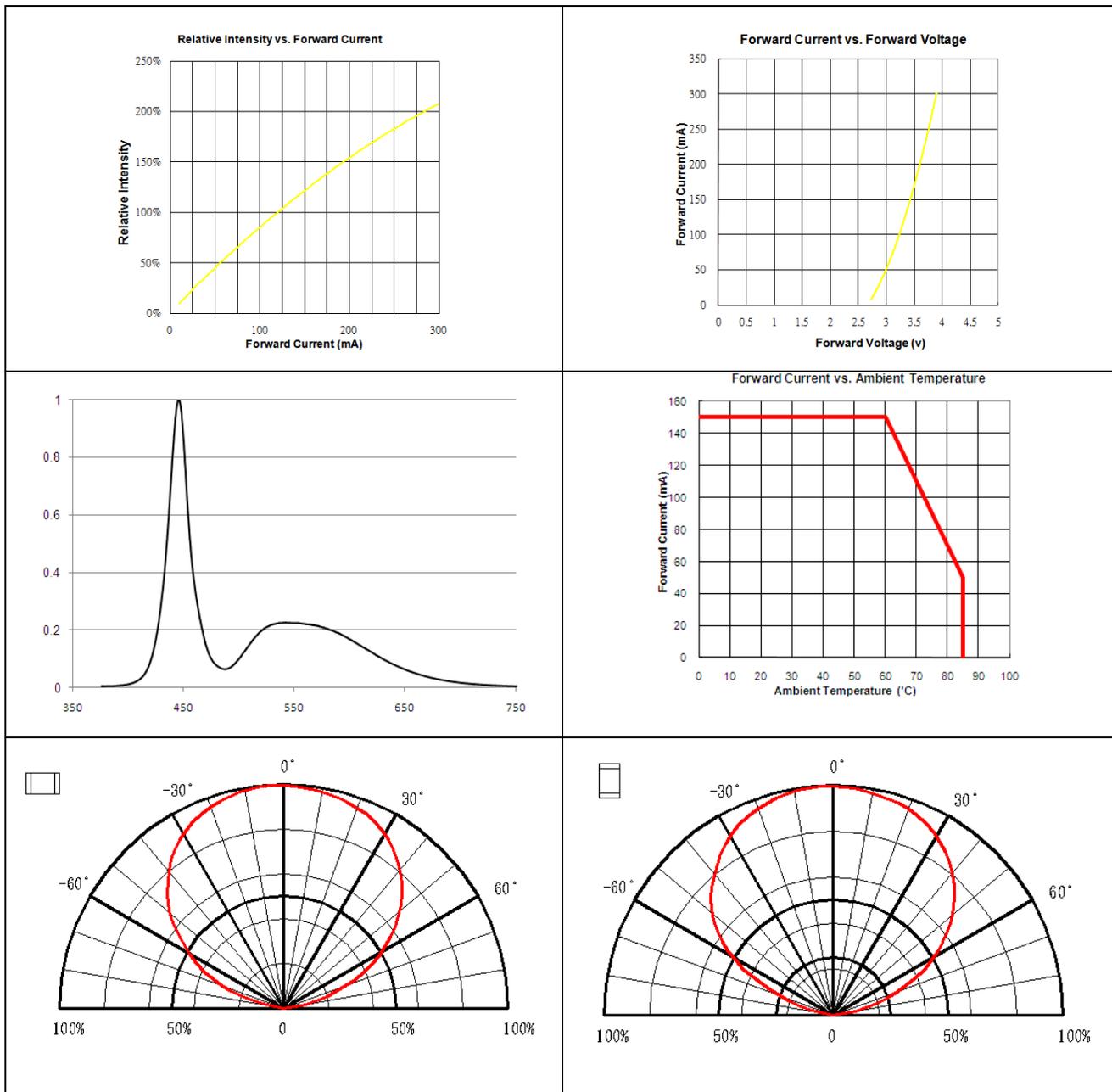
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**Characteristic Curves for TW @60mA**



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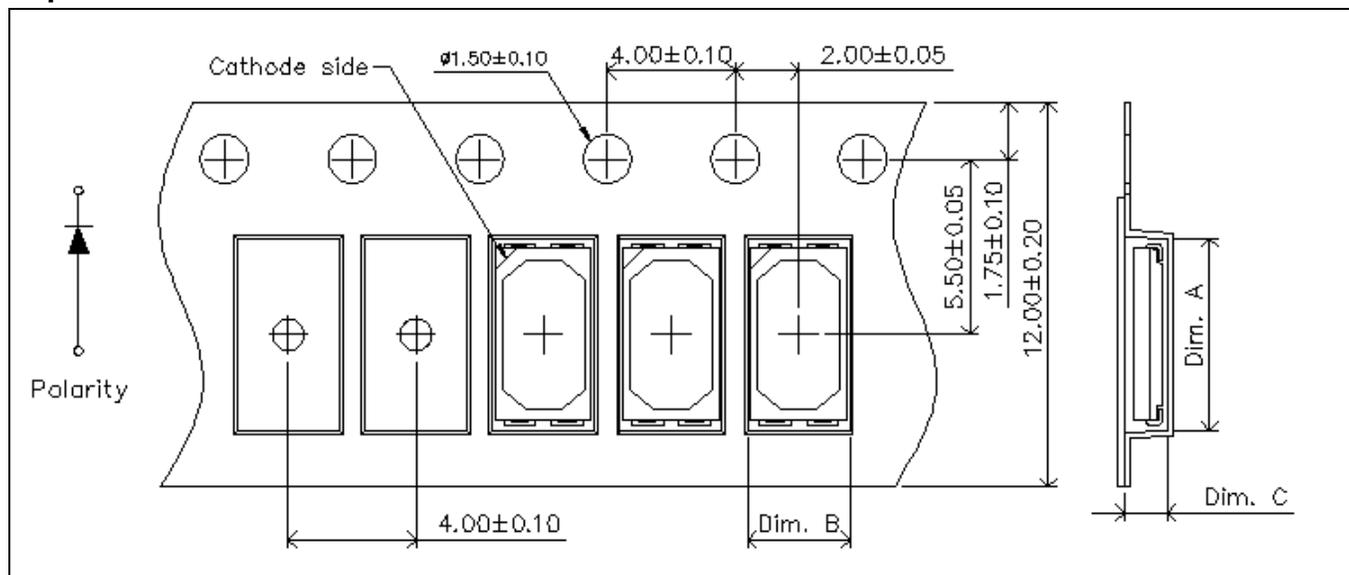
**Characteristic Curves for TW @150mA**



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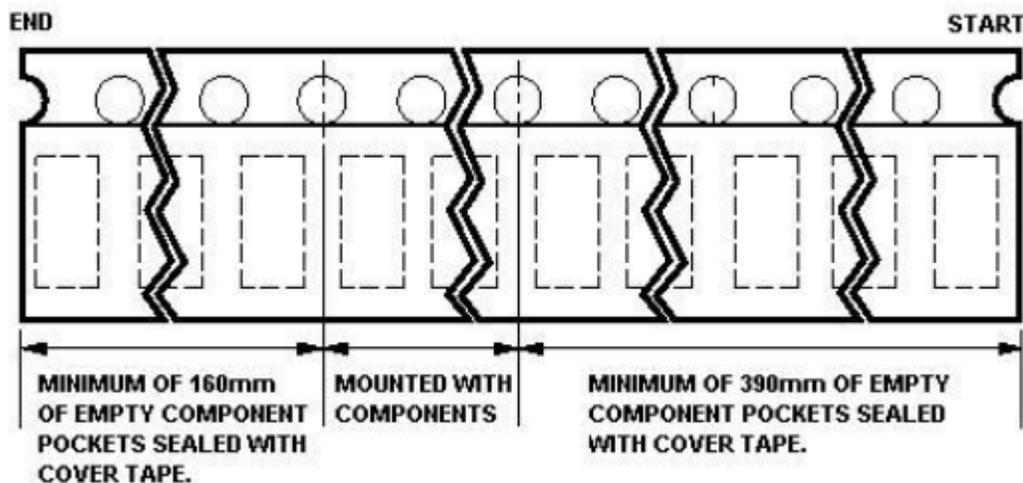
**Packaging**

**Tape Dimension**



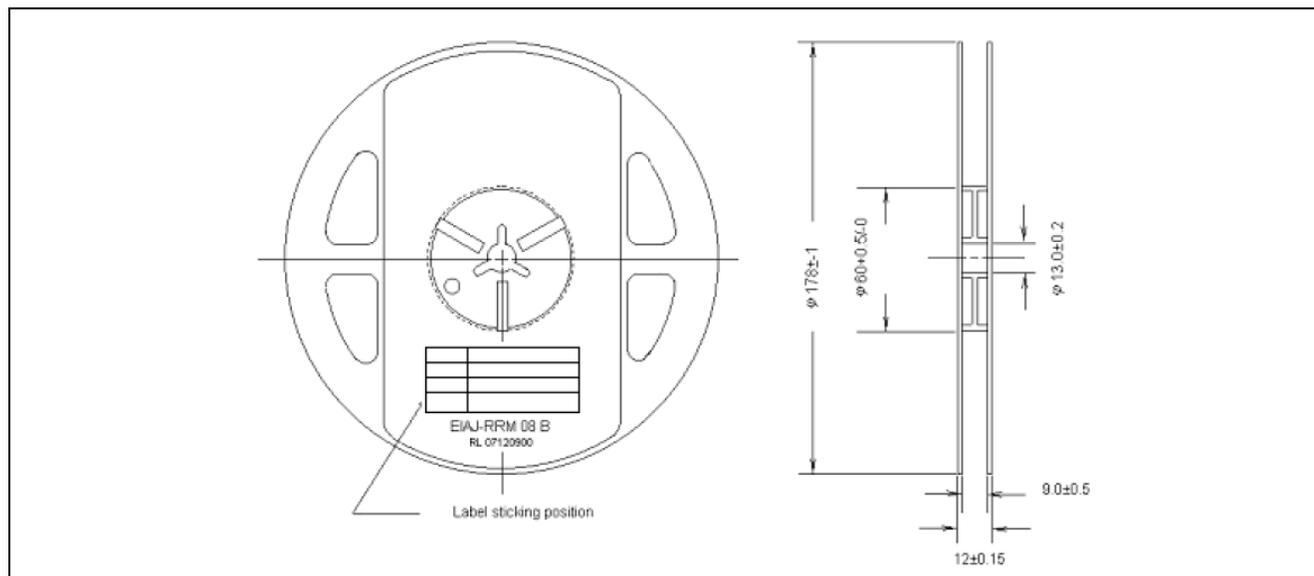
Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-T5301	$6.0 \pm 0.1$	$3.2 \pm 0.1$	$1.1 \pm 0.1$	2K

**Unit: mm**

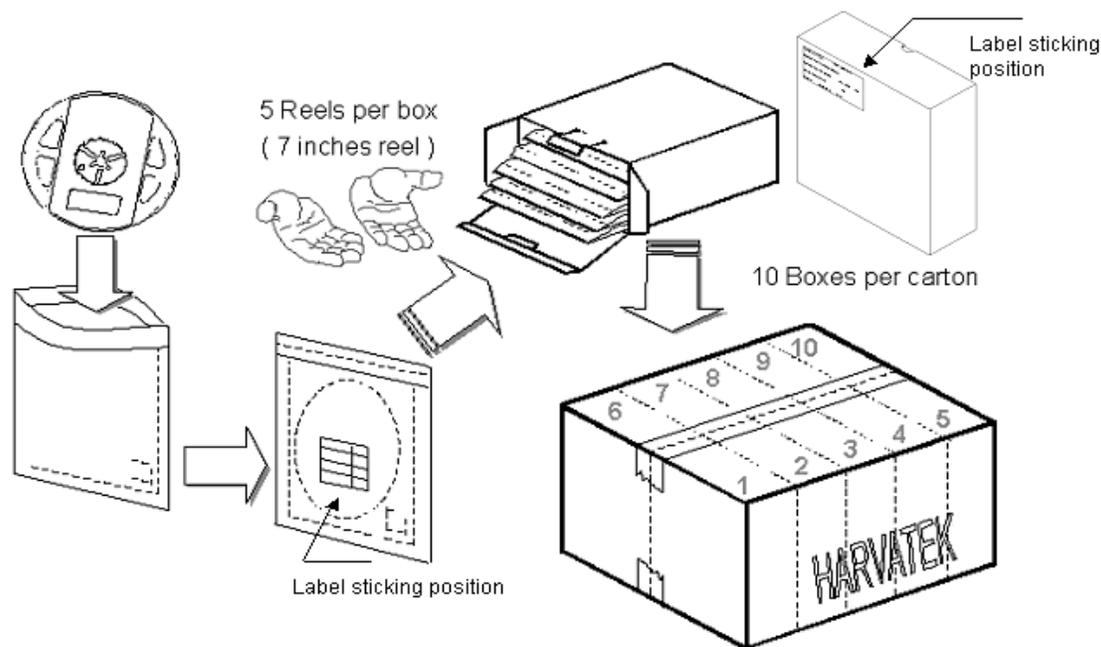


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**Reel Dimension**



**Packing**



5 boxes per carton is available depending on shipment quantity.

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## Precaution of Application

### Designing 1: Soldering pattern

The dimensions of the recommended soldering pattern may not meet every user. Please confirm and study first before designing the soldering pattern in order to obtain the best performance of soldering.

### Designing 2: Circuit layout

Due to the circuit design is not available, assuming the circuit is in parallel and a resistor that is put in series in the circuit, it cannot provide an effective current-limiting function to the LEDs due to each LED had a different inherent resistance. In general, the LEDs usually have a different inherent resistance. Different inherent resistance will cause different current, the LED on the different path would be driven at different power, and the result was the LED with a higher resistance would be dimmer than the other. To solve this situation, a suitable resistor is put in series with each LED to limit the current disparity through the LED will be very useful.

### Designing 3: Max Rating

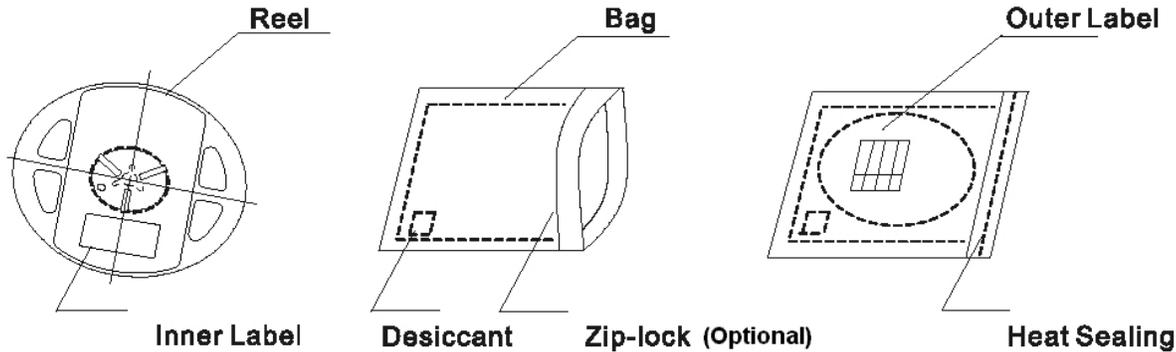
Any application should refer to the specifications of absolute maximum ratings.

### Dry Pack

Any SMD optical device, like this chip LED, is **MOISTURE SENSITIVE device**. Avoid absorbing moisture at any time during transportation or storage. Every reel will be packaged in the moisture barrier anti-static bag (Specific bag material will depend upon customers' requirement or option). And the bag is well sealed before shipment. By customer's requirement, we will put a humidity indicator in each moisture barrier anti-static bag before shipment.

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The packaging sequence is as follows:



### Storage

It's recommended to store the products in the following conditions: Humidity: 60 %RH Max.

Temperature: 5°C ~30°C (41°F~86°F)

1. Shelf life in sealed bag: 12 month at <math>40^{\circ}\text{C}</math> and <math>90\% \text{RH}</math>. (Base on aluminum laminated moisture barrier bag.)
2. After the bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be:
  - 2.1 Mounted within 72 hours at factory conditions of  $\leq 30^{\circ}\text{C} / 60\% \text{RH}$ , or
  - 2.2 Stored at  $\leq 20\% \text{RH}$  with zip-lock sealed.

### Baking

It's recommended to bake before soldering once the pack is unsealed open & re-sealed after 72 hours.

The conditions are as followings:

$60 \pm 3^{\circ}\text{C} \times (12 \sim 24 \text{hrs})$  and <math>5\% \text{RH}</math>, taped reel type

$100 \pm 3^{\circ}\text{C} \times (45 \text{min} \sim 1 \text{hr})$ , bulk type

$130 \pm 3^{\circ}\text{C} \times (15 \sim 30 \text{min})$ , bulk type

### Soldering

Manual soldering (We do not recommend this method strongly.)

Soldering wire: 63/37 Sn/Pb, flux contained.

To prevent cracking, please bake before manual soldering, if the device is subject to moisture.

Temperature at tip of soldering tool:  $300^{\circ}\text{C} \pm 5^{\circ}\text{C}$  Max.(25W)

It's banned to load any stress on the resin during soldering.

Soldering time:  $3 \pm 1 \text{sec}$

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**Handling of Silicone Resin LEDs**

Handling Indications

During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.



Figure 1

In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.

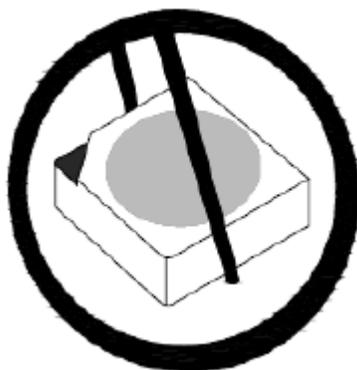


Figure 2

When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented.

This is assured by choosing a pick and place nozzle which is large than LEDs reflector area.

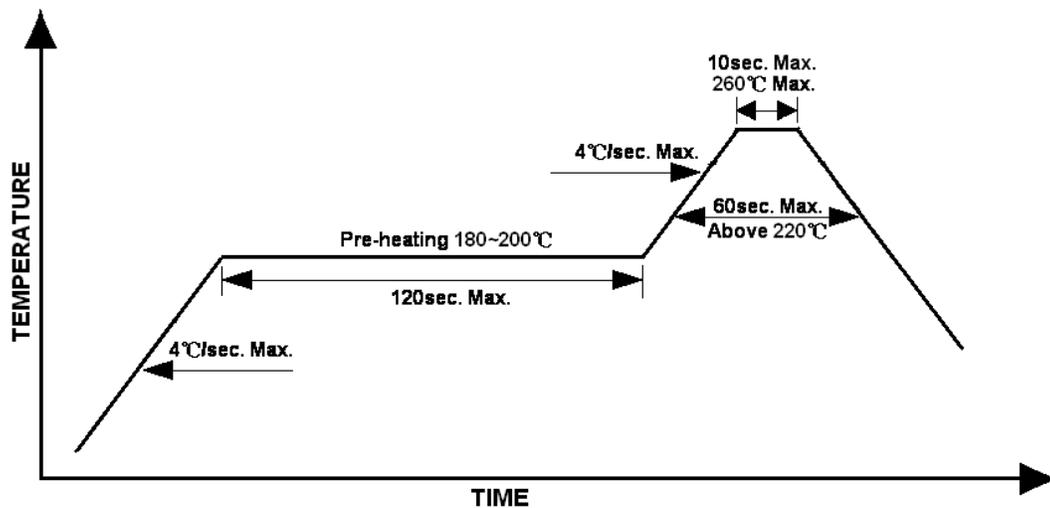
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**Reflow Soldering**

Recommend soldering paste specifications:

1. Operating temp.: Above 220°C, 60 sec.
2. Peak temp.:260°C Max., 10sec Max.
3. Reflow soldering should not be done more than two times.
4. Never attempt next process until the component is cooled down to room temperature after reflow.
5. The recommended reflow soldering profile (measured on the surface of the LED terminal) is as following:

**Lead-free Solder Profile**



**Cleaning**

Following are cleaning procedures after soldering:

- An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.
- Temperature x Time should be 50°C x 30sec. or <30°C x 3min
- Ultra sonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 °C max, <3min

**Cautions of Pick and Place**

- Avoid stress on the resin at elevated temperature.
- Avoid rubbing or scraping the resin by any object.
- Electro-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended.

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**Revision History**

Changes since last revision	Page	Version No.	Revision Date
Initial release		1.0	06-25-2013

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