

Harvatek Surface Mount LEDs Approval Sheet  
**Model No.: HT-T1401DNC**

Official Product	HT Part No. HT-T1401DNC	Your Part No.		Data Sheet No.
Tentative Product	*****	*****		
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**Introduction**

- *The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by HARVATEK for any infringements of intellectual property or other rights of the third parties which may result from its use.*
- *Harvatek is continually effort to improve the quality of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing HARVATEK products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such HARVATEK products cause loss of human life, bodily injury or damage to property.*
- *The HARVATEK products listed in this document are intended for usage in general electronics (computer, personal equipment, office equipment, industrial robotics, domestic, etc...) These products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury.*
- *In developing your designs, please ensure that HARVATEK products are used within specified operating ranges as set forth in the most recent HARVATEK products specifications.*
- *Also, please keep in mind the precautions listed in this document.*

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## Product Specification

	Specification	Material	Quantity
Flux	8.2-12.1 lm 2750-7500K @30mA / Ta= 25° C Tolerance±7%		
Chromaticity Coordinates	Refer to page 6~8 @30mA / Ta= 25° C Tolerance x, y± 0.005		
Vf	2.7-3.5V (0.1V/bin) @30mA / Ta= 25° C Tolerance±0.05V		
Resin	Yellow	Silicon resin	
Carrier tape	According to EIA 481-1A specs	Conductive black tape	2000pcs per reel
Reel	According to EIA 481-1A specs	Conductive black	
Label	HT standard	Paper	
Packing bag	220x240mm	Aluminum laminated bag/ no-zipper	One reel one bag
Carton	HT standard	Paper	Non-specified

### Others:

Every mid-box will be loaded 5 reels. These 5 reels can be different in lot, Iv, lambda, or Vf. Every reel will have an independent label to identify its specification and the mid-box there will have a corresponding label post on it.

### ATTENTION: Electricstatic Discharge (ESD) protection



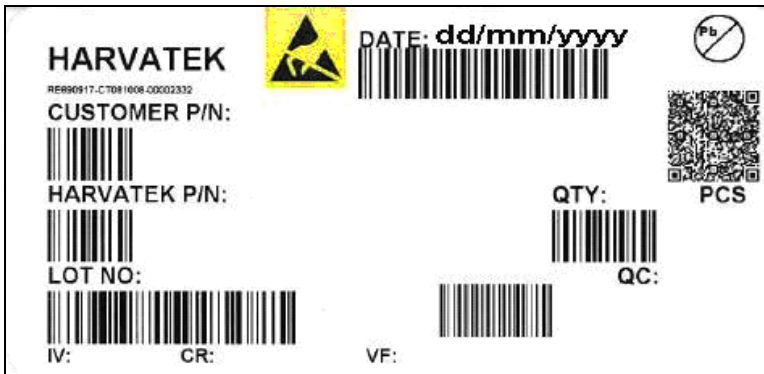
The symbol shown on the page herein to introduce 'Electro-Optical Characteristics'. ESD protection for GaP and AlGaAs based chips is still necessary even though they are safe in low static-electric discharge. Material in AlInGaP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**.

ESD protection has to be considered and taken in the initial design stage.

If manual work/process is needed, please ensure the device is well protective from ESD during all the process.

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**Label Spec.:**



■ Customer P/N: To Be Defined

■ Harvatek P/N

**H T - T 1 4 0 1 DNC**

Series Name	Dice	Emitting Color
HT-T1401: 4.0x1.4x0.7mm Without zener	1 Chip	DNC White CRI>70 Each chip @ 30mA

■ 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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**Bin Code.**

■ **Iv Bin:**

Color	Bin Code	Specs( lm)
White	PK1	8.2-9.4 lm
	PK2	9.4-10.7 lm
	PL1	10.7-12.2 lm
	PL2	12.2-13.9 lm

Luminous Intensity Measurement Allowance is  $\pm 7\%$

Color Temperature		Iv Bin		
Min.	Max.	Min.	Typ.	Max.
2750K	3750K	PK1	PK2	PL1
3750K	6750K	PK1	PK2	PL1
6750K	9500K	PK1	PK2	PL1

■ **Vf Bin:**

Bin Code	Spec. Range
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

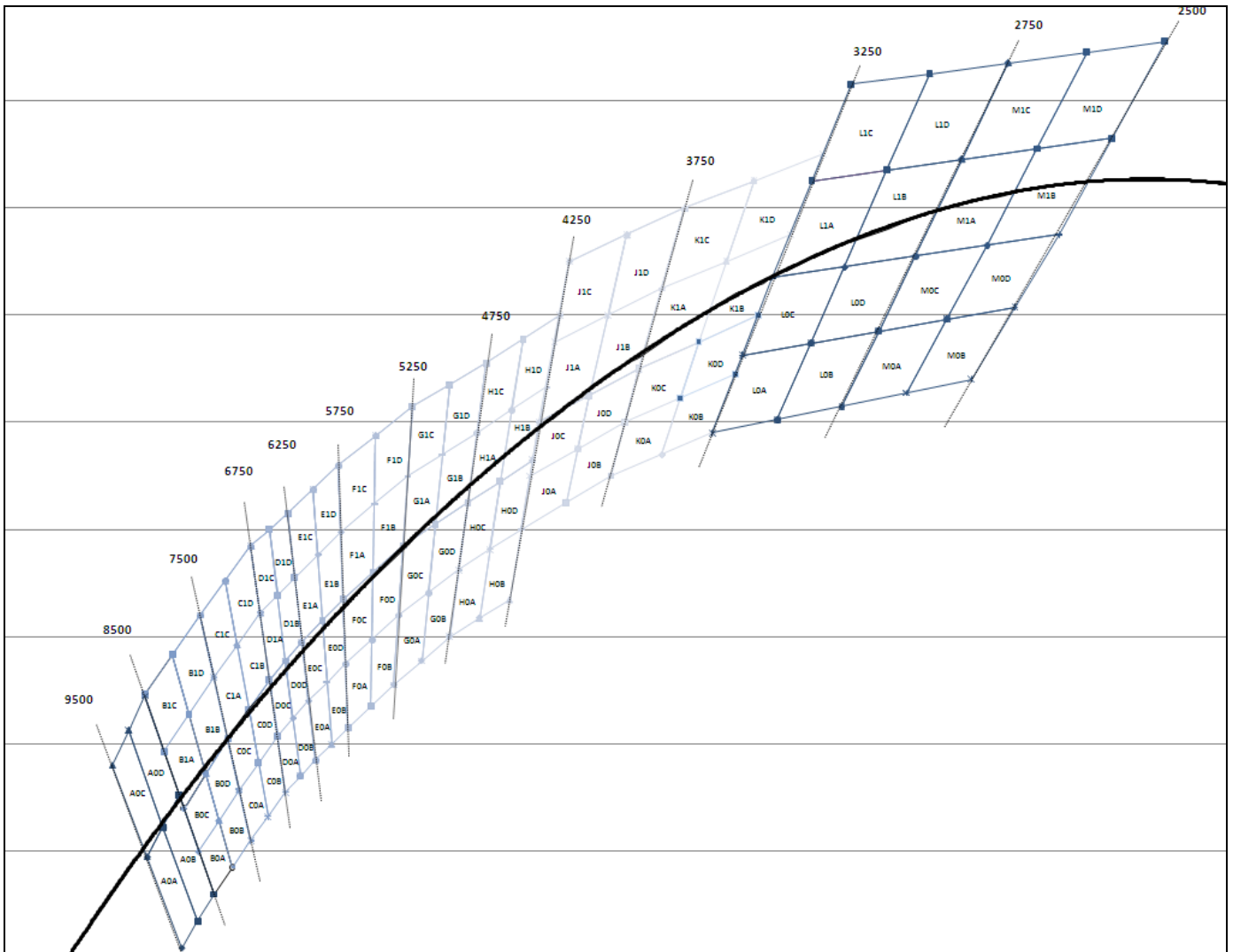
Forward Voltage Measurement Allowance is  $\pm 0.05V$

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### Color Rank:

B0A	7500-8000k	B1A	7500-8000k	B0B	7500-8000k	B1B	7500-8000k	B0C	8000-8500k	B1C	8000-8500k	B0D	8000-8500k	B1D	8000-8500k
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.298	0.282	0.2915	0.298	0.302	0.287	0.29625	0.3045	0.29625	0.3045	0.289	0.32663	0.301	0.311	0.295	0.334
0.2915	0.298	0.283	0.31926	0.29625	0.3045	0.289	0.32663	0.2915	0.298	0.283	0.31926	0.29625	0.3045	0.289	0.32663
0.29625	0.3045	0.289	0.32663	0.301	0.311	0.295	0.334	0.29475	0.29	0.28725	0.30863	0.299125	0.29575	0.292625	0.315565
0.302	0.287	0.29625	0.3045	0.306	0.292	0.301	0.311	0.299125	0.29575	0.292625	0.315565	0.3035	0.3015	0.298	0.3225
0.298	0.282	0.2915	0.298	0.302	0.287	0.29625	0.3045	0.29625	0.3045	0.289	0.32663	0.301	0.311	0.295	0.334
C0A	6750-7000K	C1A	6750-7000K	C0B	6750-7000K	C1B	6750-7000K	C0C	7000-7500K	C1C	7000-7500K	C0D	7000-7500K	C1D	7000-7500K
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	0.3055	0.3165	0.3055	0.3165	0.3005	0.3405	0.31	0.322	0.306	0.347
0.301	0.311	0.295	0.334	0.3055	0.3165	0.3005	0.3405	0.301	0.311	0.295	0.334	0.3055	0.3165	0.3005	0.3405
0.3055	0.3165	0.3005	0.3405	0.31	0.322	0.306	0.347	0.3035	0.3015	0.298	0.3225	0.307625	0.3065	0.303	0.3285
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	0.3055	0.3165	0.3055	0.3165	0.3005	0.3405	0.31	0.322	0.306	0.347
D0A	6500-6750K	D1A	6500-6750K	D0B	6500-6750K	D1B	6500-6750K	D0C	6250-6500K	D1C	6250-6500K	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	0.3135	0.3255	0.31	0.35	0.317	0.329	0.314	0.353
0.31	0.322	0.306	0.347	0.3135	0.3255	0.31	0.35	0.31	0.322	0.306	0.347	0.3135	0.3255	0.31	0.35
0.3135	0.3255	0.31	0.35	0.317	0.329	0.314	0.353	0.31175	0.3115	0.308	0.3345	0.3151	0.31475	0.31175	0.33775
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	0.3135	0.3255	0.31	0.35	0.317	0.329	0.314	0.353
E0A	6000K-6250K	E1A	6000K-6250K	E0B	6000K-6250K	E1B	6000K-6250K	E0C	5750-6000K	E1C	5750-6000K	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	0.3215	0.333	0.3195	0.3575	0.326	0.337	0.325	0.362
0.317	0.329	0.314	0.353	0.3215	0.333	0.3195	0.3575	0.317	0.329	0.314	0.353	0.3215	0.333	0.3195	0.3575
0.3215	0.333	0.3195	0.3575	0.326	0.337	0.325	0.362	0.3185	0.318	0.3155	0.341	0.3225	0.3215	0.3205	0.34525
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	0.3215	0.333	0.3195	0.3575	0.326	0.337	0.325	0.362
F0A	5500-5750K	F1A	5500-5750K	F0B	5500-5750K	F1B	5500-5750K	F0C	5250-5500K	F1C	5250-5500K	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	0.3325	0.342	0.333	0.3675	0.339	0.347	0.341	0.373
0.326	0.337	0.325	0.362	0.3325	0.342	0.333	0.3675	0.326	0.337	0.325	0.362	0.3325	0.342	0.333	0.3675
0.3325	0.342	0.333	0.3675	0.339	0.347	0.341	0.373	0.3265	0.325	0.3255	0.3495	0.33225	0.3295	0.33275	0.35475
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	0.3325	0.342	0.333	0.3675	0.339	0.347	0.341	0.373
G0A	5000K-5250K	G1A	5000K-5250K	G0B	5000K-5250K	G1B	5000K-5250K	G0C	4750-5000K	G1C	4750-5000K	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	0.346	0.351	0.349	0.377	0.353	0.355	0.357	0.381
0.339	0.347	0.341	0.373	0.346	0.351	0.349	0.377	0.339	0.347	0.341	0.373	0.346	0.351	0.349	0.377
0.346	0.351	0.349	0.377	0.353	0.355	0.357	0.381	0.338	0.334	0.34	0.36	0.3445	0.33825	0.3475	0.364
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	0.346	0.351	0.349	0.377	0.353	0.355	0.357	0.381
H0A	4500-4750K	H1A	4500-4750K	H0B	4500-4750K	H1B	4500-4750K	H0C	4250-4500K	H1C	4250-4500K	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	0.36	0.359	0.365	0.3855	0.367	0.363	0.373	0.39
0.353	0.355	0.357	0.381	0.36	0.359	0.365	0.3855	0.353	0.355	0.357	0.381	0.36	0.359	0.365	0.3855
0.36	0.359	0.365	0.3855	0.367	0.363	0.373	0.39	0.351	0.3425	0.355	0.368	0.35775	0.34625	0.3625	0.37225
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	0.3785
0.349	0.33	0.353	0.355	0.3555	0.3335	0.36	0.359	0.36	0.359	0.365	0.3855	0.367	0.363	0.373	0.39
J0A	3750-4000K	J1A	3750-4000K	J0B	3750-4000K	J1B	3750-4000K	J0C	4000-4250K	J1C	4000-4250K	J0D	4000-4250K	J1D	4000-4250K
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	0.37925	0.375	0.3875	0.405	0.39	0.38	0.4	0.41
0.3685	0.37	0.375	0.4	0.37925	0.375	0.3875	0.405	0.3685	0.37	0.375	0.4	0.37925	0.375	0.3875	0.405
0.37925	0.375	0.3875	0.405	0.39	0.38	0.4	0.41	0.3665	0.36	0.37175	0.385	0.37675	0.365	0.383375	0.39
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	0.37925	0.375	0.3875	0.405	0.39	0.38	0.4	0.41
K0A	3550-3750K	K1A	3550-3750K	K0B	3550-3750K	K1B	3550-3750K	K0C	3250-3550K	K1C	3250-3550K	K0D	3250-3550K	K1D	3250-3550K
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	0.403	0.385	0.415	0.415	0.416	0.39	0.43	0.42
0.39	0.38	0.4	0.41	0.403	0.385	0.415	0.415	0.39	0.38	0.4	0.41	0.403	0.385	0.415	0.415
0.403	0.385	0.415	0.415	0.416	0.39	0.43	0.42	0.387	0.37	0.395	0.395	0.399	0.3745	0.409	0.4
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	0.403	0.385	0.415	0.415	0.416	0.39	0.43	0.42
L0A	2750-3250K	L0B	2750-3250K	L0C	2750-3000K	L0D	2750-3000K	L1A	2750-3250K	L1B	2750-3250K	L1C	2750-3000K	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	0.36800	0.42000	0.37050	0.41250	0.38250	0.42725	0.38475	0.41900	0.39700	0.43450	0.39900	0.42750	0.41500	0.44375	0.41700
M0A	2500-2750K	M0B	2250-2500K	M0C	2500-2750K	M0D	2250-2500K	M1A	2500-2750K	M1B	2250-2500K	M1C	2500-2750K	M1D	2250-2500K
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											

## Color Rank Corrdinates



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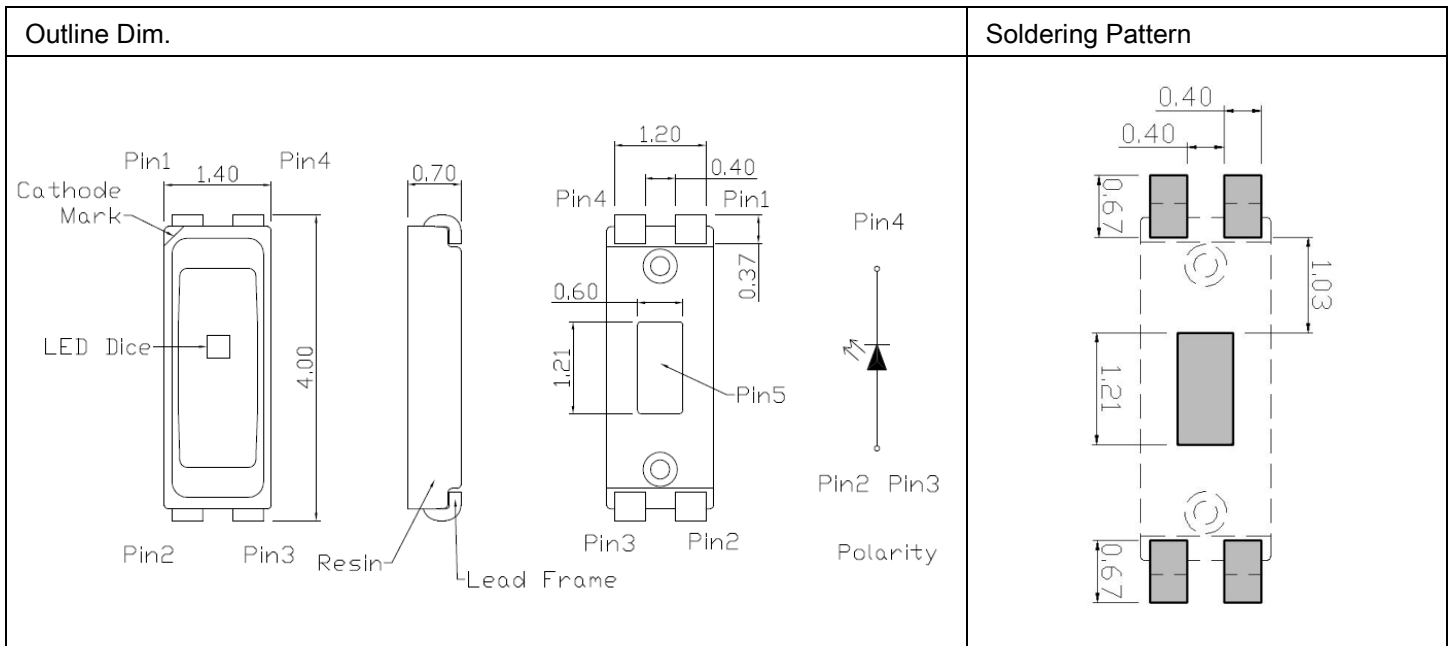
## Electro-Optical Characteristics

(Each chip @ 30mA, T<sub>a</sub> 25 °C)

Product No.	Lighting Color	Material	V <sub>F</sub> (V)		Color	Flux(lm)
			min	max	CIE coordinates x, y	typ
HT-T1401DNC	White	InGaN	2.7	3.5	Typ x=0.329, y=0.342	10.5

## Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1



**Pin1 is connected with heat slug**

Soldering terminal may shift in x, y direction.

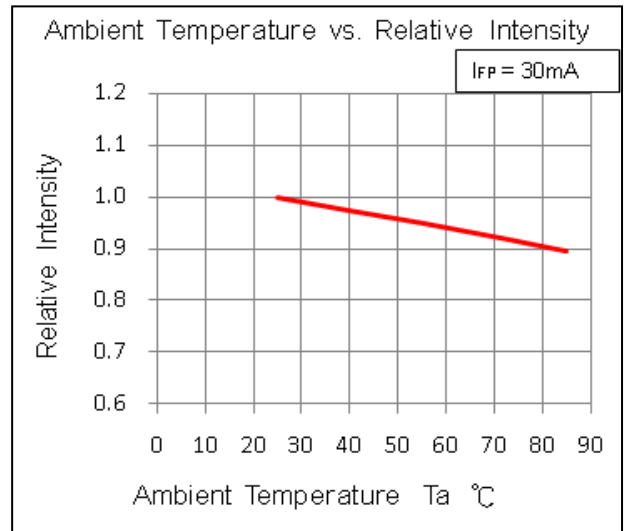
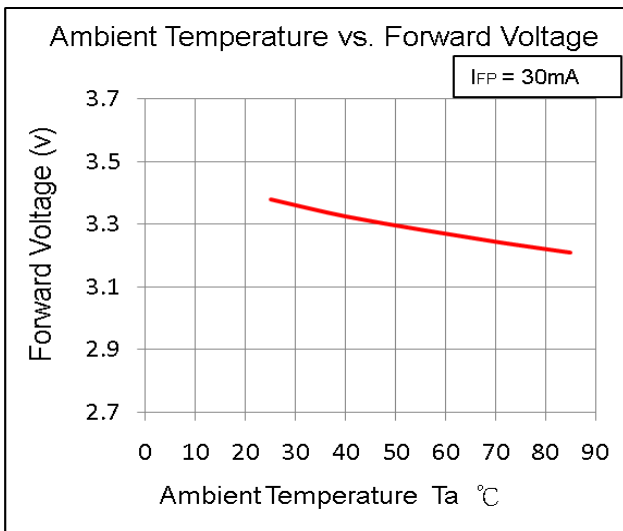
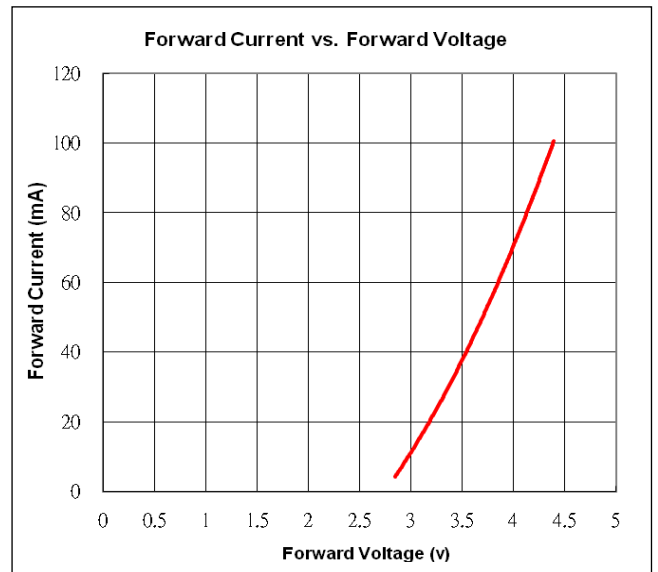
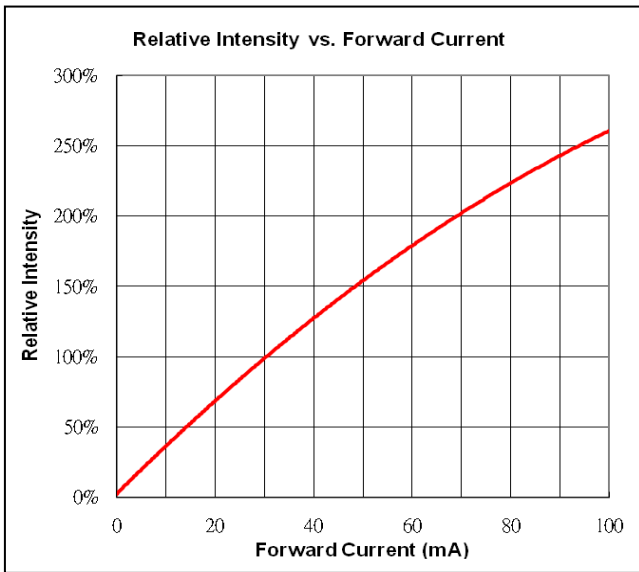
## Absolute Maximum Ratings

Series	P <sub>d</sub> (mW)	I <sub>F</sub> (mA)	I <sub>FP</sub> (mA)**	V <sub>R</sub> (V)	I <sub>R</sub> (uA)	T <sub>OP</sub> (°C)	T <sub>ST</sub> (°C)
T1401DNC	88	30	100	5	<100@ V <sub>R</sub> = 5	-40~+85	-40~+85

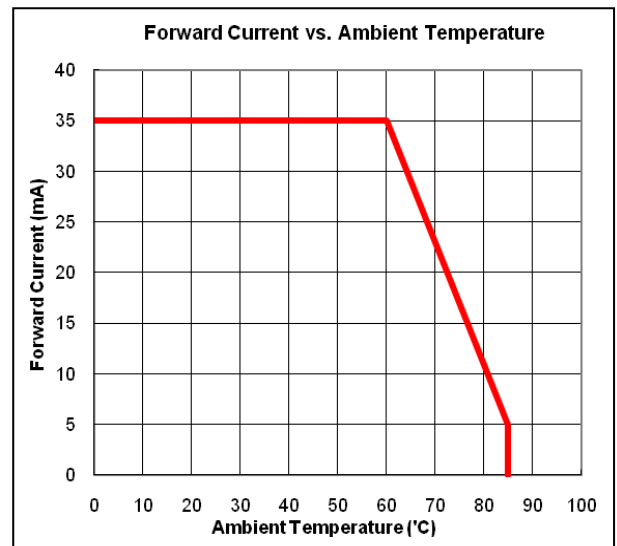
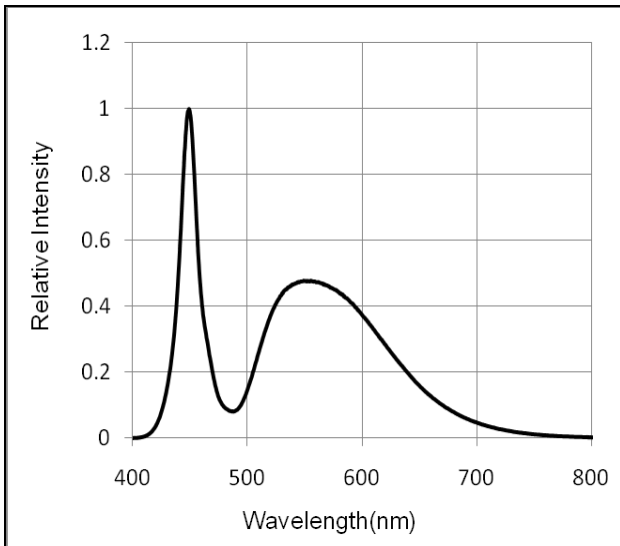
\* Condition for I<sub>FP</sub> is pulse of 1/10 duty and 0.1msec width

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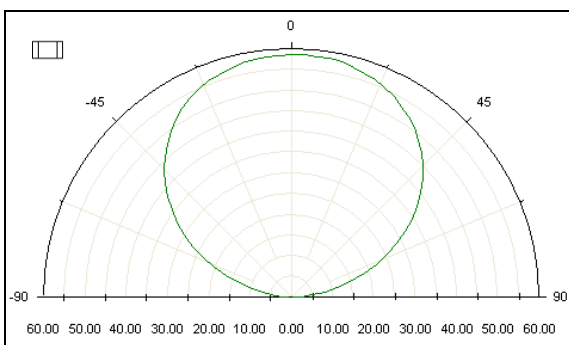
## Characteristics



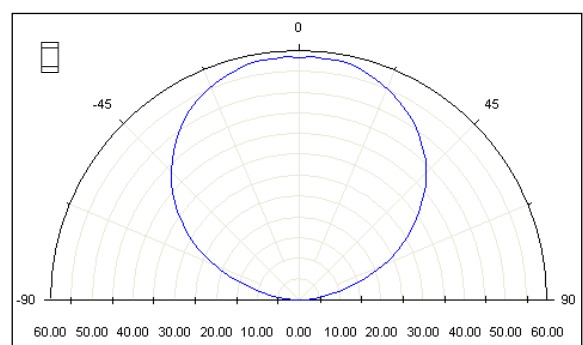
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Directive Characteristics

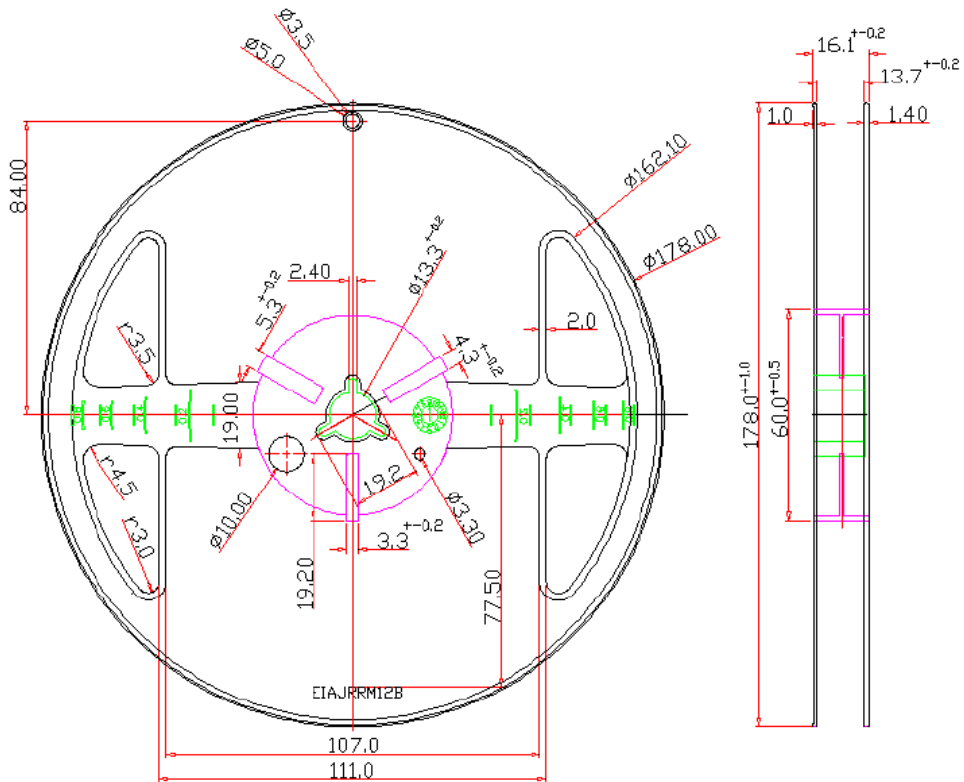
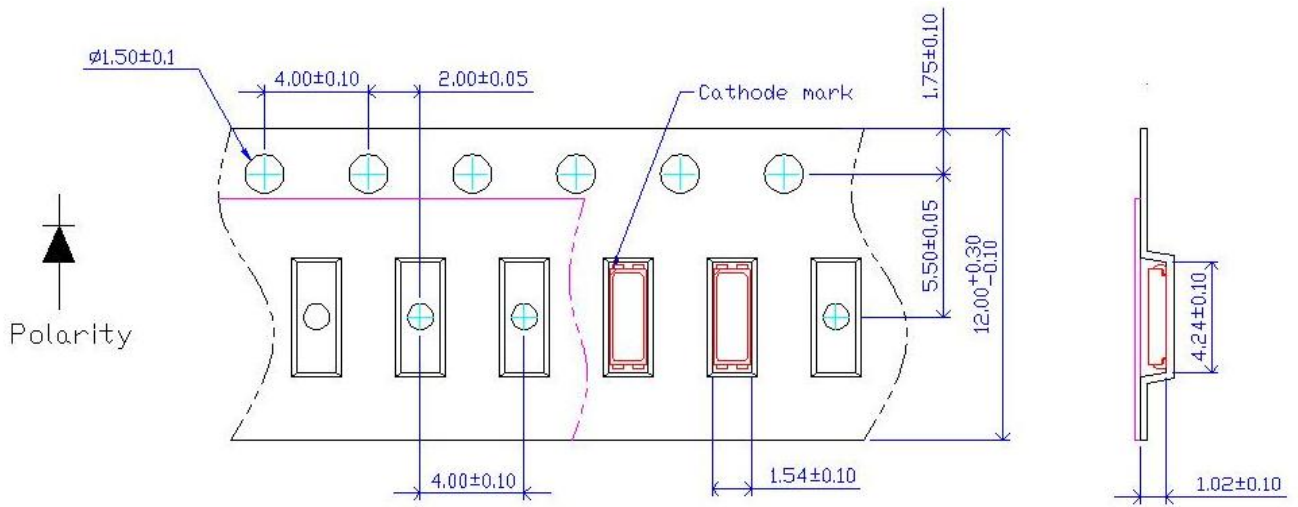


Directive Characteristics



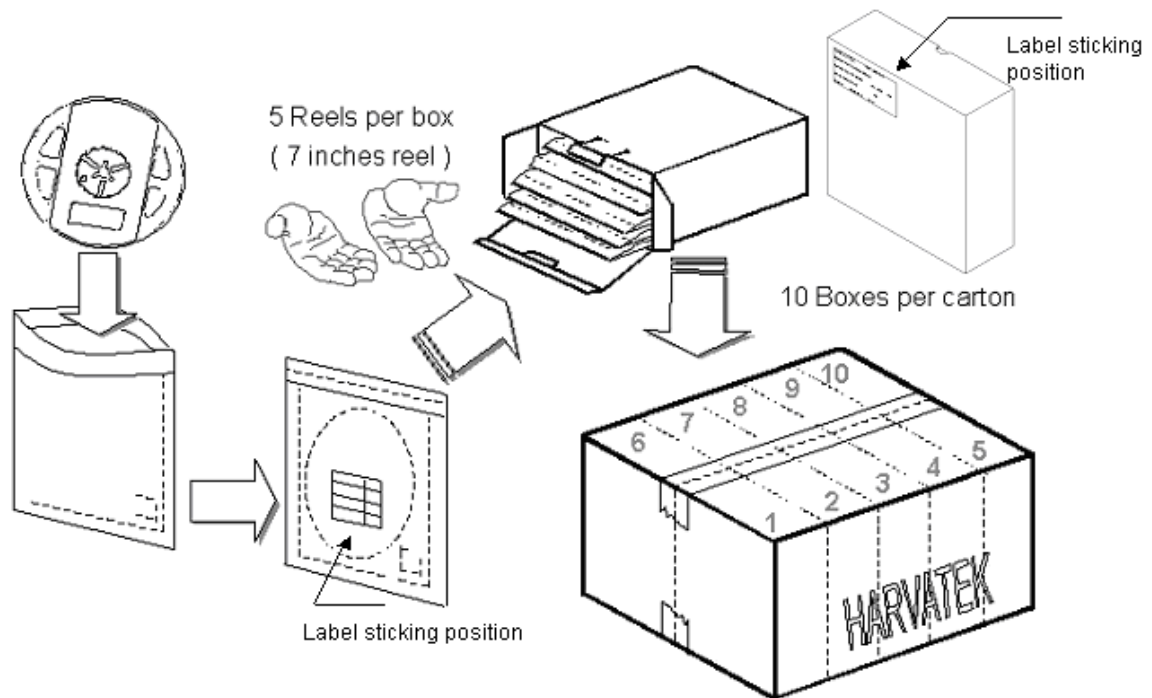
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## Reel Dimension



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## Packing



5 boxes per carton is available depending on shipment quantity.

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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 are recommended to be used within seven days after unpacked. In accordance with MSL 2a: After the bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be mounted within 672 hours at factory conditions of  $\leq 30$  °C/60%RH.
  - (5). The appearance and specifications of products may be modified for improvement. We will provide PCN for any change or improvement.
  - (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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**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.

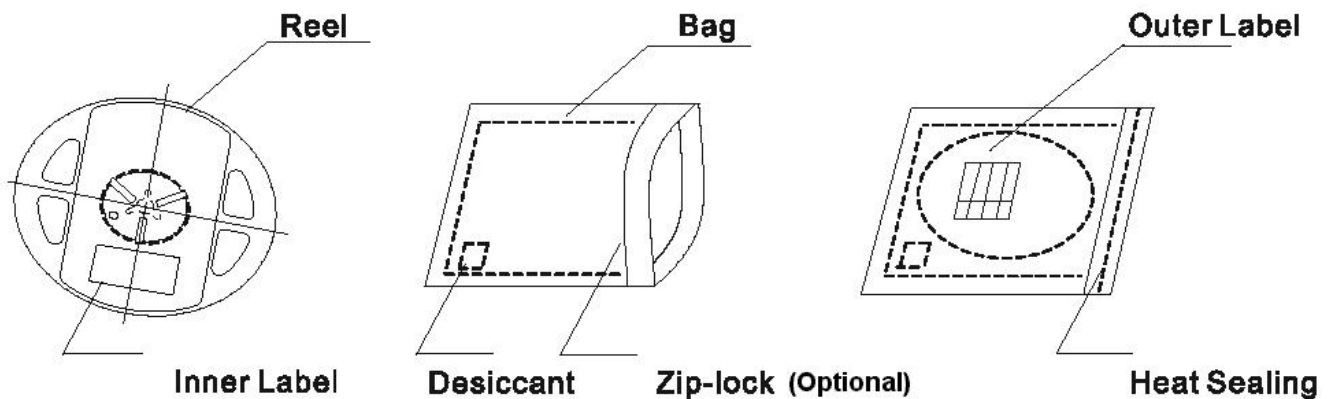
**Dry Pack**

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 package



## 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.

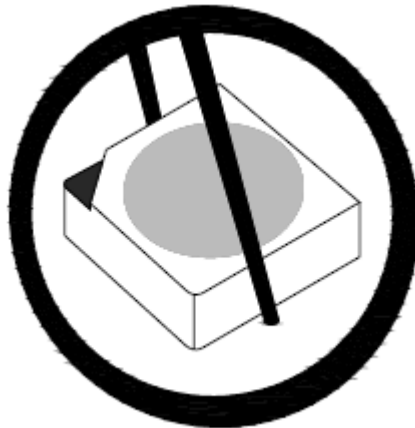


Figure 2

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.

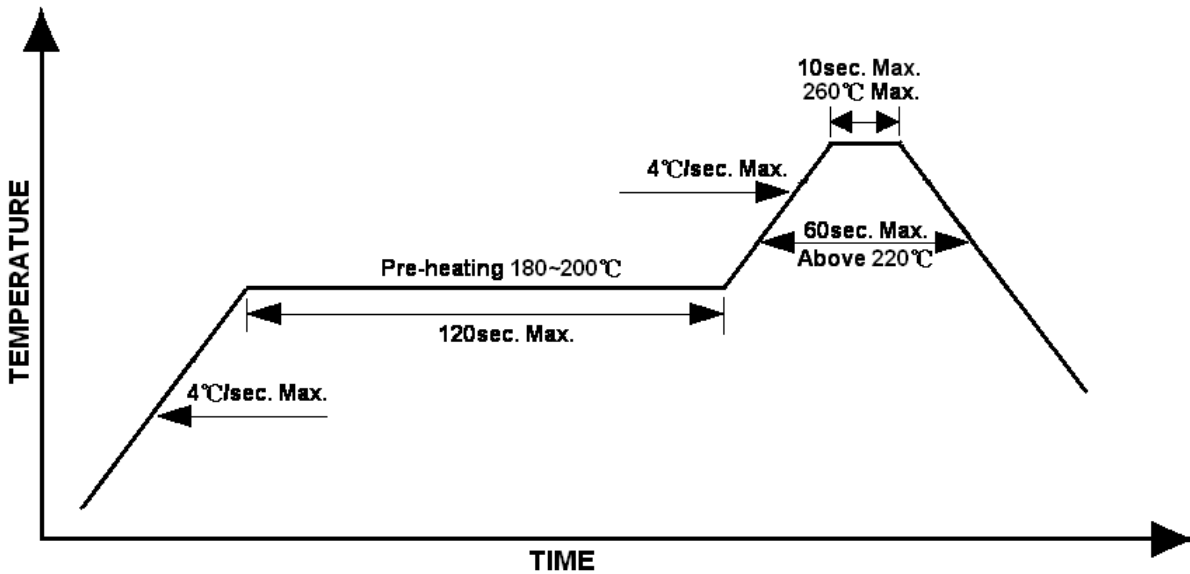
This is assured by choosing a pick and place nozzle which is large than LEDs reflector area.

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**Reflow Soldering**

1. Recommend soldering paste specifications:
2. Operating temp.: Above 220 °C ,60sec
3. Peak temp.:260 °CMax.,10sec Max.
4. Never take next process until the component is cooled down to room temperature after reflow.
5. The recommended reflow soldering profile (measuring on the surface of the LED terminal) is following:

Lead-free Solder



**Cleaning**

The conditions of cleaning after soldering:

An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.

Temperature×Time: <50 °C×30sec, or <30 °C×3min

Ultra sonic cleaning: < 15W/ bath; Bath volume: 1liter max.

Curing: 100 °C max, <3min

Do not contact with component on the assembly board.

**Cautions of Pick and Place**

It should be avoided to load stress on the resin during high temperature.

Avoid rubbing or scraping the resin by any object.

Electric-static may cause damage to the component. Please confirm that the equipment grounding well. Using an ionizer fan is recommended.

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