

**Harvatek Surface Mount Chip LED Data Sheet**  
**HT-T157 Series\_60mA**

Official Product	Product: HT-T157 Series			Data Sheet No.
Tentative Product	*****			HT-T157 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Oct 25, 2013	Version of 1.0	Page 1/18

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**LIFE SUPPORT POLICY**

HARVATEK’s products are not authorized for use as critical components in life support devices or systems without the express written approval of the President of HARVATEK or HARVATEK INTERNATIONAL. As used herein:

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-T157DNC: 20.62lm min. HT-T157DND: - lm min. @60mA / Ta=25° C, ± 10%		
XY	Refer to Page 7&8 @60mA / Ta=25° C, ± 0.005		
Vf	2.9-3.4V max @60mA / Ta=25°C, ± 0.05 V		
Resin	Yellow	Silicon Resin	
Carrier tape	Per EIA 481-1A specs	Conductive black tape	
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, λD 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 1 5 7 X X X - Y Y Y Y**

Series Name	Emitting Color	Customer Code
<b>HT-T157</b> HT: Harvatek T157: 3.1 (L) x 2.1 (W) x 0.8 (H) mm	<b>DNC: CRI&gt;70</b> <b>DND: CRI&gt;80</b>	<b>YYYY</b> Customer Product Code (TBD)

**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 (Im) Bin:**

Bin	Luminous Intensity Range (Im)	
	Minimum	Maximum
NC2	20.6	22.0
ND1	22.0	23.5
AP1	23.5	25.1
BP1	25.1	26.8

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

■ **Forward Voltage (V<sub>F</sub>) Bin:**

Color	Bin Code	Spec. Range
White	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<sup>o</sup> C, Tolerance: ± 0.05 V

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AC	0.275	0.298	BC	0.2895	0.3135	CC	0.3028	0.3304	DC	0.3207	0.3462	EC	0.3376	0.3616
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687
	0.2855	0.2985		0.2984	0.3133		0.313	0.329		0.329	0.3417		0.3451	0.3554
	0.279	0.291		0.292	0.306		0.3048	0.3207		0.3215	0.335		0.3371	0.349
AD	0.2855	0.2985	BD	0.2984	0.3133	CD	0.313	0.329	DD	0.329	0.3417	ED	0.3451	0.3554
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687
	0.2895	0.3135		0.3028	0.3304		0.3205	0.3481		0.3376	0.3616		0.3551	0.376
	0.292	0.306		0.3048	0.3207		0.3213	0.3373		0.3371	0.349		0.3533	0.362
AL1	0.2855	0.2985	BL1	0.2984	0.3133	CL1	0.313	0.329	DL1	0.329	0.3417	EL1	0.3451	0.3554
	0.2874	0.276		0.298	0.288		0.3093	0.2993		0.3231	0.312		0.3361	0.3245
	0.283	0.284		0.295	0.297		0.3068	0.3113		0.3222	0.3243		0.3366	0.3369
	0.289	0.2905		0.3009	0.3042		0.3144	0.3186		0.329	0.33		0.344	0.3428
AL2	0.2925	0.282	BL2	0.3037	0.2937	CL2	0.3161	0.3059	DL2	0.329	0.318	EL2	0.3429	0.3307
	0.2925	0.282		0.3009	0.3042		0.3144	0.3186		0.329	0.33		0.344	0.3428
	0.295	0.297		0.3068	0.3113		0.3221	0.3261		0.3366	0.3369		0.3515	0.3487
	0.298	0.288		0.3093	0.2993		0.3231	0.312		0.3361	0.3245		0.3495	0.3339
AU1	0.2925	0.282	BU1	0.3037	0.2937	CU1	0.3161	0.3059	DU1	0.329	0.318	EU1	0.3429	0.3307
	0.275	0.298		0.2895	0.3135		0.3028	0.3304		0.3207	0.3462		0.3376	0.3616
	0.2718	0.3036		0.2864	0.3221		0.3005	0.3415		0.3196	0.3602		0.3381	0.3762
	0.279	0.313		0.2937	0.3312		0.3099	0.3509		0.329	0.369		0.348	0.384
AU2	0.28225	0.30575	BU2	0.2962	0.322	CU2	0.3115	0.3391	DU2	0.329	0.3538	EU2	0.3463	0.3687
	0.275	0.298		0.2895	0.3135		0.3028	0.3304		0.3207	0.3462		0.3376	0.3616
	0.279	0.313		0.2937	0.3312		0.3099	0.3509		0.329	0.369		0.348	0.384
	0.2864	0.3221		0.3005	0.3415		0.3196	0.3602		0.3381	0.3762		0.3571	0.3907
AU2	0.2895	0.3135	BU2	0.3028	0.3304	CU2	0.3205	0.3481	DU2	0.3376	0.3616	EU2	0.3551	0.376
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687
	0.279	0.313		0.2937	0.3312		0.3099	0.3509		0.329	0.369		0.348	0.384
	0.2864	0.3221		0.3005	0.3415		0.3196	0.3602		0.3381	0.3762		0.3571	0.3907

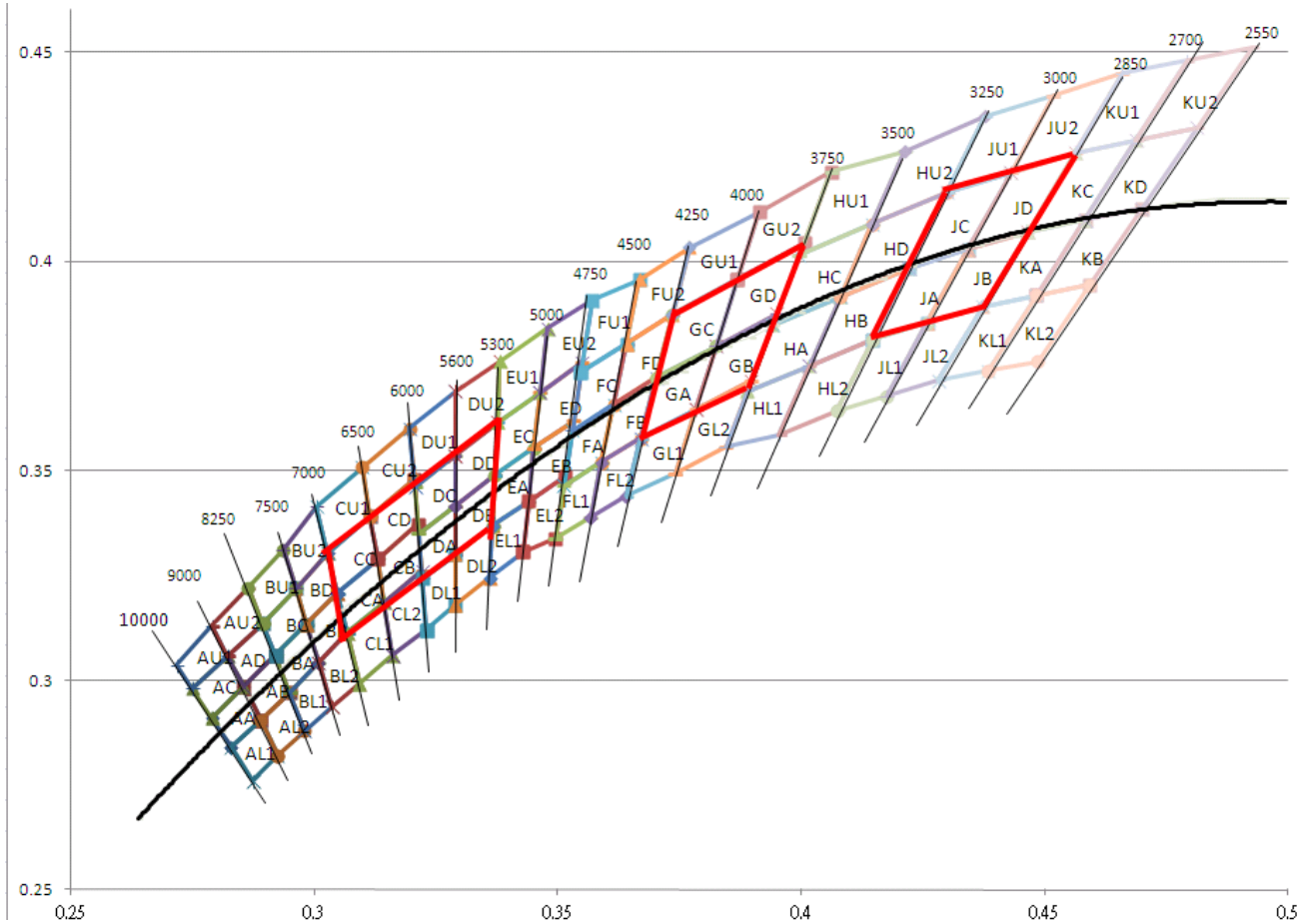
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FA	0.3512	0.3465	GA	0.367	0.3578	HA	0.3889	0.369	JA	0.4147	0.3814	KA	0.4373	0.3893
	0.353	0.3597		0.3702	0.3722		0.3941	0.3848		0.4221	0.3984		0.4465	0.4071
	0.3615	0.3659		0.3825	0.3798		0.408	0.3916		0.4342	0.4028		0.4582	0.4099
	0.359	0.3521		0.3783	0.3646		0.4017	0.3751		0.4259	0.3853		0.4483	0.3919
	0.3512	0.3465		0.367	0.3578		0.3889	0.369		0.4147	0.3814		0.4373	0.3893
FB	0.359	0.3521	GB	0.3783	0.3646	HB	0.4017	0.3751	JB	0.4259	0.3853	KB	0.4483	0.3919
	0.3615	0.3659		0.3825	0.3798		0.408	0.3916		0.4342	0.4028		0.4582	0.4099
	0.3702	0.3722		0.395	0.3875		0.4221	0.3984		0.4465	0.4071		0.47	0.4126
	0.367	0.3578		0.3898	0.3716		0.4147	0.3814		0.4373	0.3893		0.4593	0.3944
	0.359	0.3521		0.3783	0.3646		0.4017	0.3751		0.4259	0.3853		0.4483	0.3919
FC	0.353	0.3597	GC	0.3702	0.3722	HC	0.3941	0.3848	JC	0.4221	0.3984	KC	0.4465	0.4071
	0.3548	0.3736		0.3736	0.3874		0.3996	0.4015		0.4299	0.4165		0.4562	0.426
	0.3641	0.3804		0.3869	0.3958		0.4146	0.4089		0.443	0.4212		0.4687	0.4289
	0.3615	0.3659		0.3825	0.3798		0.408	0.3916		0.4342	0.4028		0.4582	0.4099
	0.353	0.3597		0.3702	0.3722		0.3941	0.3848		0.4221	0.3984		0.4465	0.4071
FD	0.3615	0.3659	GD	0.3825	0.3798	HD	0.408	0.3916	JD	0.4342	0.4028	KD	0.4582	0.4099
	0.3641	0.3804		0.3869	0.3958		0.4146	0.4089		0.443	0.4212		0.4687	0.4289
	0.3736	0.3874		0.4006	0.4044		0.4299	0.4165		0.4562	0.426		0.4813	0.4319
	0.3702	0.3722		0.395	0.3875		0.4221	0.3984		0.4465	0.4071		0.47	0.4126
	0.3615	0.3659		0.3825	0.3798		0.408	0.3916		0.4342	0.4028		0.4582	0.4099
FL1	0.3495	0.3339	GL1	0.364	0.344	HL1	0.3846	0.3557	JL1	0.4073	0.3644	KL1	0.4281	0.3715
	0.3512	0.3465		0.367	0.3578		0.3889	0.369		0.4147	0.3814		0.4373	0.3893
	0.359	0.3521		0.3783	0.3646		0.4017	0.3751		0.4259	0.3853		0.4483	0.3919
	0.3567	0.3389		0.3741	0.3494		0.3954	0.3586		0.4176	0.3678		0.4384	0.3739
	0.3495	0.3339		0.364	0.344		0.3846	0.3557		0.4073	0.3644		0.4281	0.3715
FL2	0.3567	0.3389	GL2	0.3741	0.3494	HL2	0.3954	0.3586	JL2	0.4176	0.3678	KL2	0.4384	0.3739
	0.359	0.3521		0.3783	0.3646		0.4017	0.3751		0.4259	0.3853		0.4483	0.3919
	0.367	0.3578		0.3898	0.3716		0.4147	0.3814		0.4373	0.3893		0.4593	0.3944
	0.364	0.344		0.3846	0.3557		0.4073	0.3644		0.4281	0.3715		0.4486	0.3762
	0.3567	0.3389		0.3741	0.3494		0.3954	0.3586		0.4176	0.3678		0.4384	0.3739
FU1	0.3548	0.3736	GU1	0.3736	0.3874	HU1	0.3996	0.4015	JU1	0.4299	0.4165	KU1	0.4562	0.426
	0.3571	0.3907		0.3771	0.4034		0.4062	0.4213		0.4377	0.4346		0.4659	0.4449
	0.3668	0.3957		0.3913	0.4118		0.4212	0.4262		0.4518	0.4396		0.4792	0.4479
	0.3641	0.3804		0.3869	0.3958		0.4146	0.4089		0.443	0.4212		0.4687	0.4289
	0.3548	0.3736		0.3736	0.3874		0.3996	0.4015		0.4299	0.4165		0.4562	0.426
FU2	0.3641	0.3804	GU2	0.3869	0.3958	HU2	0.4146	0.4089	JU2	0.443	0.4212	KU2	0.4687	0.4289
	0.3668	0.3957		0.3913	0.4118		0.4212	0.4262		0.4518	0.4396		0.4792	0.4479
	0.3771	0.4034		0.4062	0.4213		0.4377	0.4346		0.4659	0.4449		0.4926	0.4512
	0.3736	0.3874		0.4006	0.4044		0.4299	0.4165		0.4562	0.426		0.4813	0.4319
	0.3641	0.3804		0.3869	0.3958		0.4146	0.4089		0.443	0.4212		0.4687	0.4289

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**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)	T <sub>OP</sub> (°C)	T <sub>ST</sub> (°C)
HT-T157DNC	White	210	60	100	-40 ~ +85	-40 ~ +100
HT-T157DND	White	210	60	100	-40 ~ +85	-40 ~ +100

\* 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		Min.
HT-T157DNC	White	60	3.1	3.4	2750-7000	20.62
HT-T157DND	White	60	3.1	3.4		-

\* Per NIST standards

### Package Outline Dimension

### Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

Outline Dimension	Solder Pattern
Soldering terminals may shift in the x, y direction.	Unit: mm

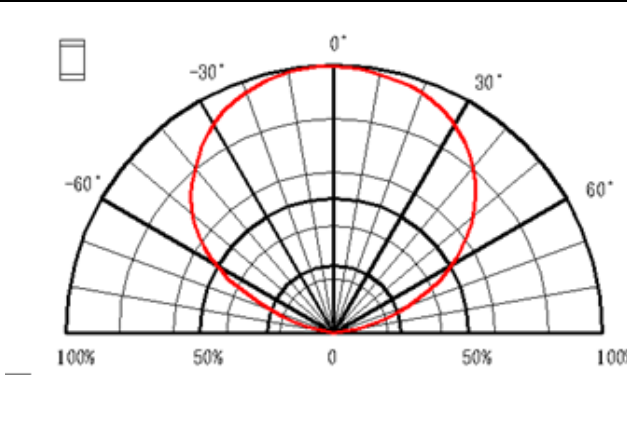
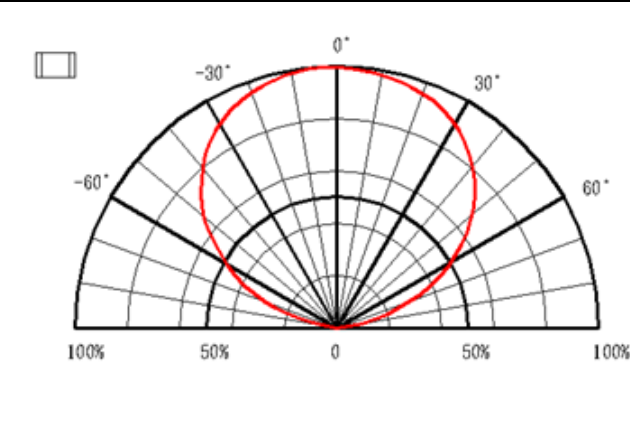
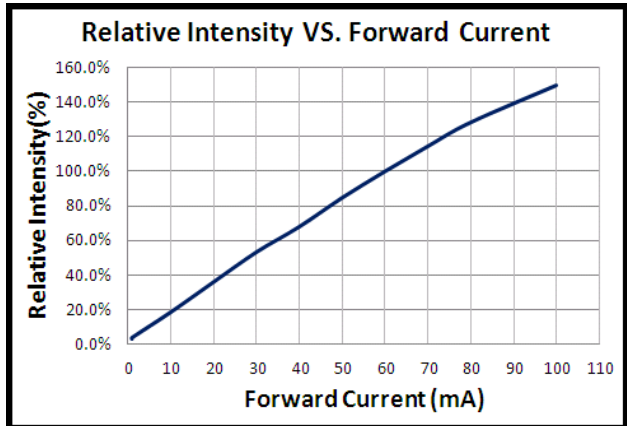
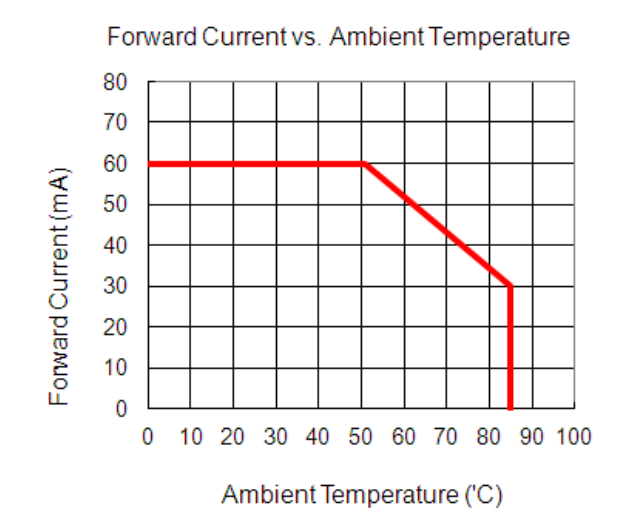
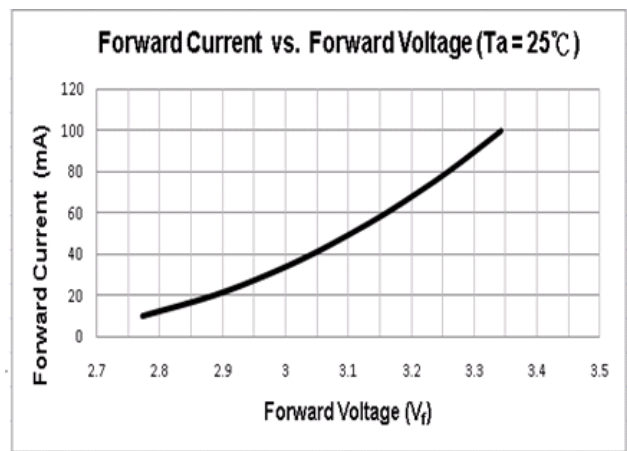
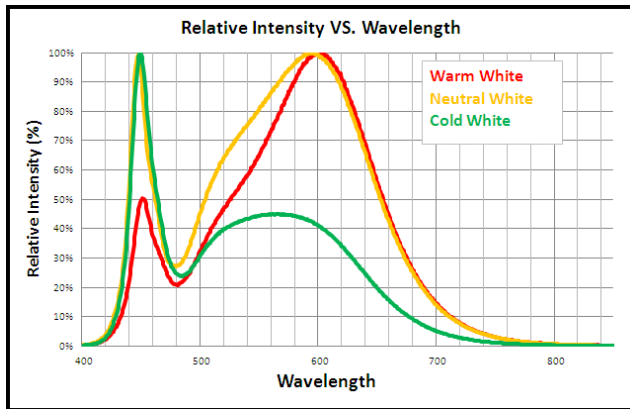
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## Precaution for Use

- 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.

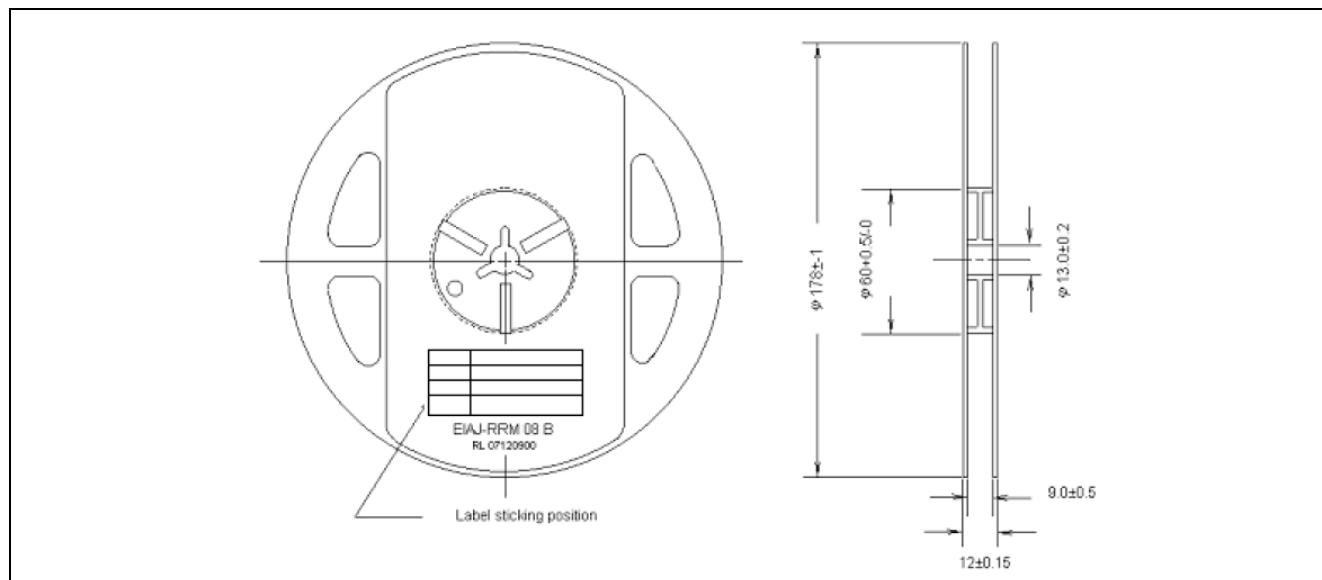
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**Characteristic Curves for White**

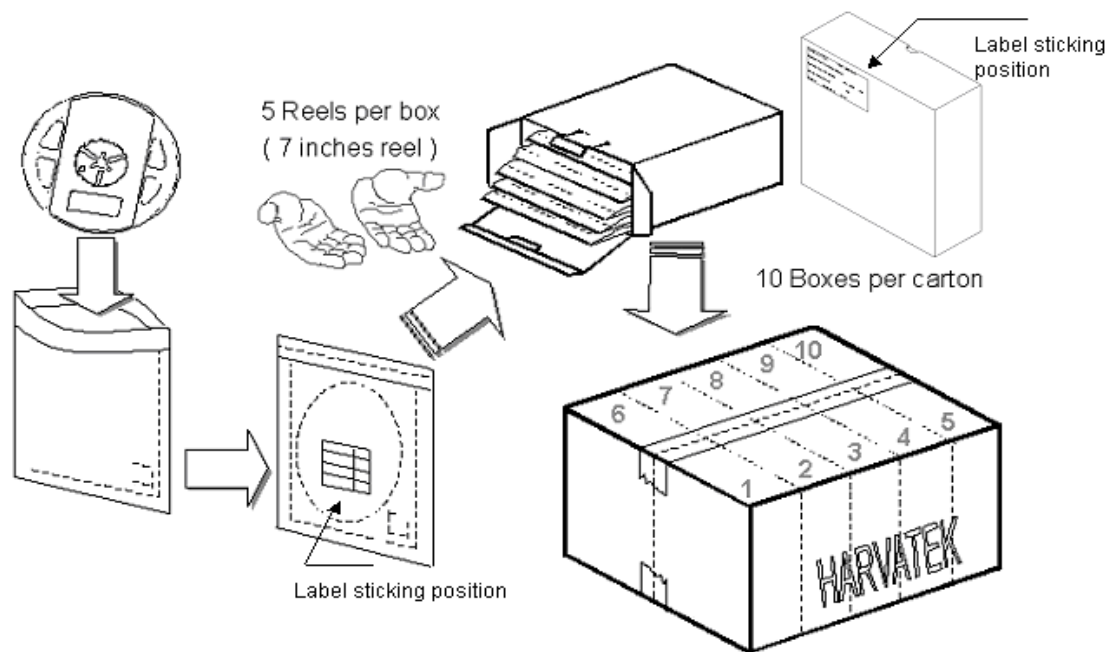


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**Reel Dimension**



**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

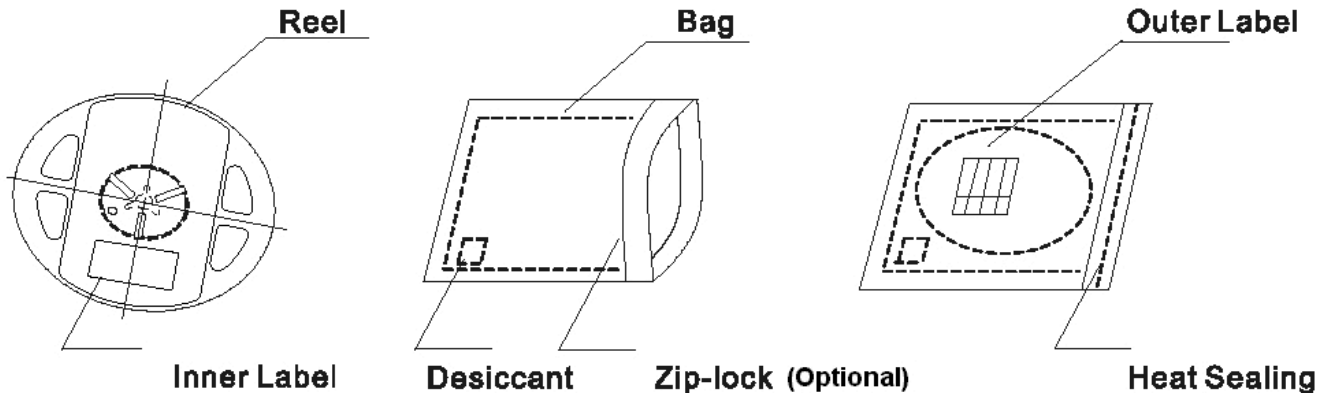
Any application should refer to the specifications of absolute maximum ratings.

### 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  $< 5\% \text{RH}$ , 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.

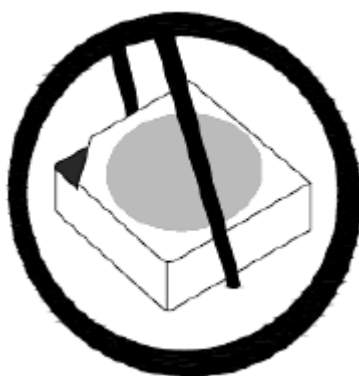


Figure 2

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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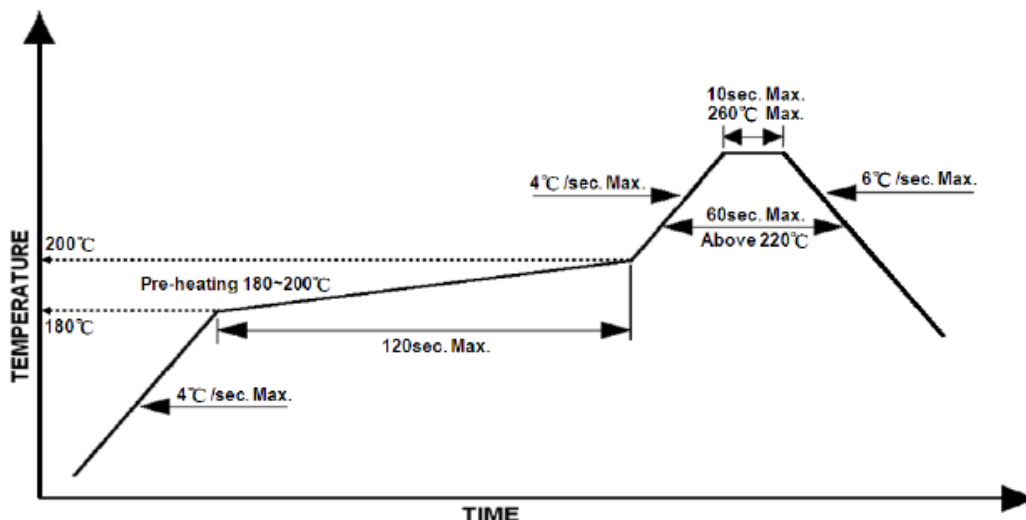


**Reflow Soldering**

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	10-29-2013

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