Harvatek Surface Mount LEDs Approval Sheet

Model No.: HT-T3212DND-A2

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 it 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.

Product Specification

	Specification	Material	Quantity
Flux	82-121.55lm @150mA / Ta= 25^{O} C Tolerance±10%		
Chromaticity Coordinates	Refer to page 6~8 @150mA / Ta= 25^{O} C Tolerance x, y± 0.005		
Vf	6.0~7.0V (0.1V/bin) @150mA / Ta= 25^{O} C Tolerance±0.05V		
Color Rendering Index (CRI)	White: ≧80 @150mA/ Ta=25℃		
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:

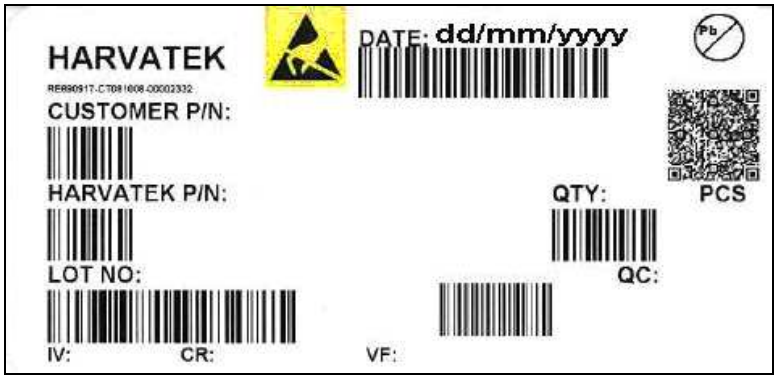
Every mid-box will be loaded 5 reels. These 5 reels can be different in lot, Iv, lambda, or Vf. Every reel will have an independent label to identify its specification and the mid-box there will have a corresponding label post on it.

ATTENTION: Electricstatic Discharge (ESD) protection

The symbol shown on the page herein to introduce 'Electro-Optical Characteristics'. ESD protection for GaP and AlGaAs is 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 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.

Label Spec.:



■Customer P/N: To Be Defined

■ Harvatek P/N

T 321 2 DND A2P- ZZZZ 12

Product	Dice	Current	Taping
L/F Not zener	2:two chip	150mA	1. Taping style 2. Q'ty

Package	Color	Series Number
3.0(L)x3.0(W)x0.52(H) mm	DND:White CRI>80	0001~ZZZZ

■ Lot No.

1	2	3	4	5	6	7	8	9	10
E	1	A	1	A	2	2	L	1	2
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		

Bin Code.

■ Iv Bin:

Color	Bin Code	Spec. Range
White	TD2	82-87.4 lm
	UA1	87.4-93.5 lm
	UB1	93.5-99.6 lm
	UC2	99.6-106.6 lm
	UD2	106.6-113.6 lm
	VA1	113.6-121.55 lm

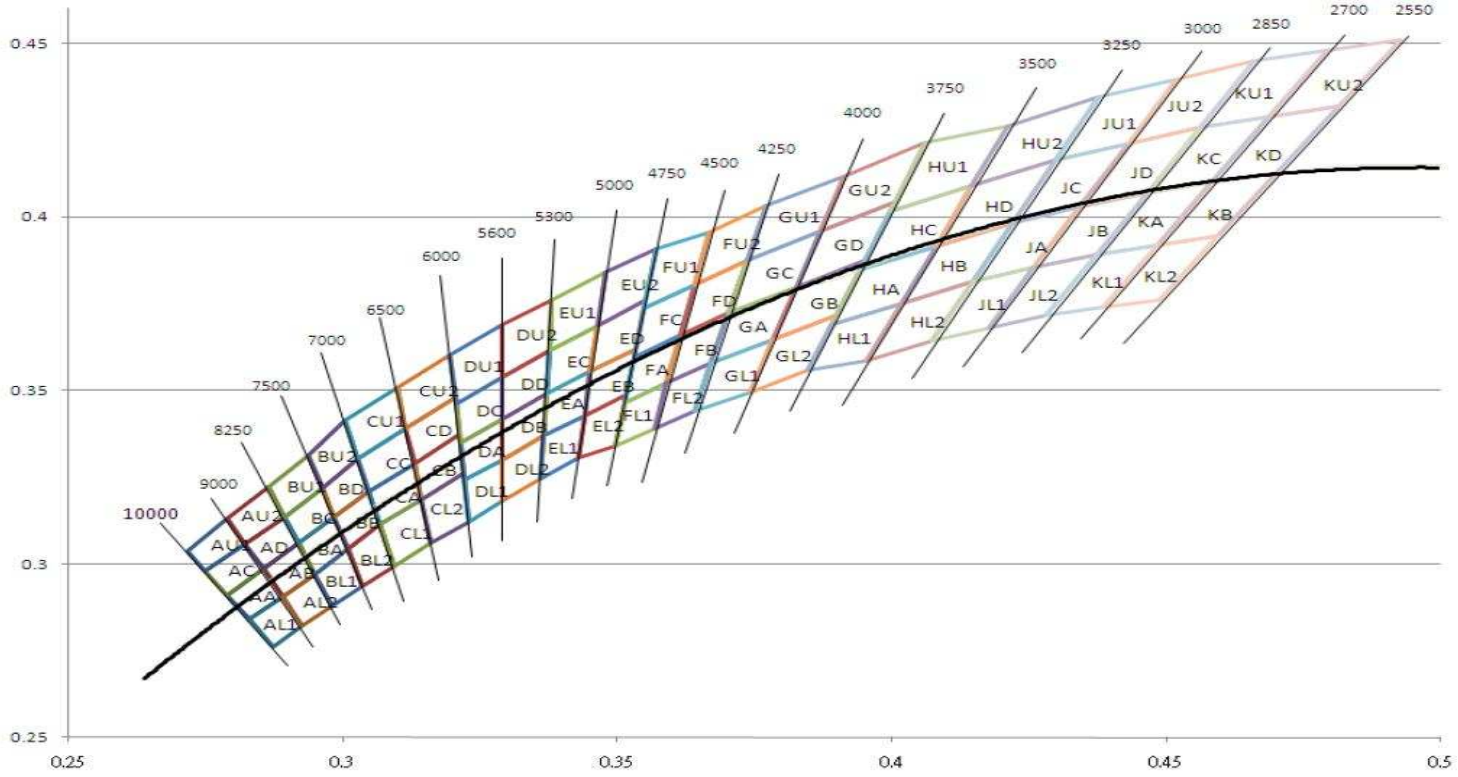
Luminous Intensity Measurement Allowance is ±10%

■ Color Rank:

	0.283	0.284		0.295	0.297		0.3068	0.3113		0.3222	0.3243		0.3366	0.3369
	0.279	0.291		0.292	0.306		0.3048	0.3207		0.3215	0.335		0.3371	0.349
AA	0.2855	0.2985	BA	0.2984	0.3133	CA	0.313	0.329	DA	0.329	0.3417	EA	0.3451	0.3554
	0.289	0.2905		0.3009	0.3042		0.3144	0.3186		0.329	0.33		0.344	0.3427
	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	0.3427
	0.2855	0.2985		0.2984	0.3133		0.313	0.329		0.329	0.3417		0.3451	0.3554
AB	0.292	0.306	BB	0.3048	0.3207	CB	0.3213	0.3373	DB	0.3371	0.349	EB	0.3533	0.362
	0.295	0.297		0.3068	0.3113		0.3221	0.3261		0.3366	0.3369		0.3515	0.3487
	0.289	0.2905		0.3009	0.3042		0.3144	0.3186		0.329	0.33		0.344	0.3427
	0.279	0.291		0.292	0.306		0.3048	0.3207		0.3215	0.335		0.3371	0.349
	0.275	0.298		0.2895	0.3135		0.3028	0.3304		0.3207	0.3462		0.3376	0.3616
AC	0.28225	0.30575	BC	0.2962	0.322	CC	0.3115	0.3391	DC	0.329	0.3538	EC	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
	0.2855	0.2985		0.2984	0.3133		0.313	0.329		0.329	0.3417		0.3451	0.3554
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687
AD	0.2895	0.3135	BD	0.3028	0.3304	CD	0.3205	0.3481	DD	0.3376	0.3616	ED	0.3551	0.376
	0.292	0.306		0.3048	0.3207		0.3213	0.3373		0.3371	0.349		0.3533	0.362
	0.2855	0.2985		0.2984	0.3133		0.313	0.329		0.329	0.3417		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
AL1	0.289	0.2905	BL1	0.3009	0.3042	CL1	0.3144	0.3186	DL1	0.329	0.33	EL1	0.344	0.3428
	0.2925	0.282		0.3037	0.2937		0.3161	0.3059		0.329	0.318		0.3429	0.3307
	0.2874	0.276		0.298	0.288		0.3093	0.2993		0.3231	0.312		0.3361	0.3245
	0.2925	0.282		0.3037	0.2937		0.3161	0.3059		0.329	0.318		0.3429	0.3307
	0.289	0.2905		0.3009	0.3042		0.3144	0.3186		0.329	0.33		0.344	0.3428
AL2	0.295	0.297	BL2	0.3068	0.3113	CL2	0.3221	0.3261	DL2	0.3366	0.3369	EL2	0.3515	0.3487
	0.298	0.288		0.3093	0.2993		0.3231	0.312		0.3361	0.3245		0.3495	0.3339
	0.2925	0.282		0.3037	0.2937		0.3161	0.3059		0.329	0.318		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
AU1	0.279	0.313	BU1	0.2937	0.3312	CU1	0.3099	0.3509	DU1	0.329	0.369	EU1	0.348	0.384
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687
	0.275	0.298		0.2895	0.3135		0.3028	0.3304		0.3207	0.3462		0.3376	0.3616
	0.28225	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
AU2	0.2864	0.3221	BU2	0.3005	0.3415	CU2	0.3196	0.3602	DU2	0.3381	0.3762	EU2	0.3571	0.3907
	0.2895	0.3135		0.3028	0.3304		0.3205	0.3481		0.3376	0.3616		0.3551	0.376
	0.28225	0.30575		0.2962	0.322		0.3115	0.3391		0.329	0.3538		0.3463	0.3687

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

Color Rank Corrdinates



■ Vf Bin:

Bin Code	Spec. Range
R1	6.0-6.1V
R2	6.1-6.2V
R3	6.2-6.3V
R4	6.3-6.4V
S1	6.4-6.5V
S2	6.5-6.6V
S3	6.6-6.7V
S4	6.7-6.8V
T1	6.8-6.9V
T2	6.9-7.0V

Forward Voltage Measurement Allowance is ±0.05V

Electro-Optical Characteristics

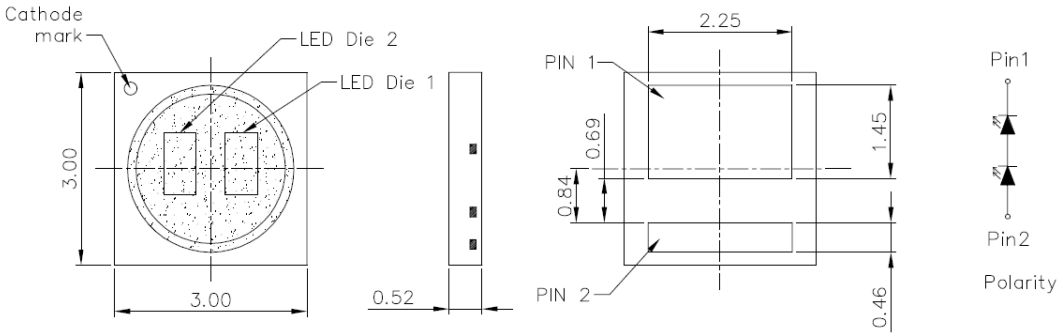
(Each chip @ 150mA, T_a 25°C)

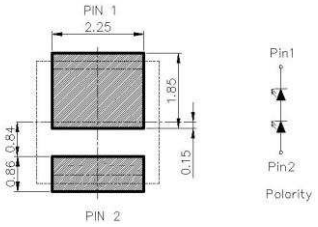
Product No.	Lighting Color	Material	V_F(V)		Color	Flux(lm)
			min	max	CIE coordinates x, y	typ
HT-T3212DND	White	InGaN	6.0	7.0	Typ x=0.33, y=0.33	100
ITEM	Symbol	TYP			MAX	Unit
Thermal Resistance	Rth_{J-S}	30			40	K/W

Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

Outline Dim.	Soldering Pattern





Soldering terminal may shift in x, y direction.

Absolute Maximum Ratings

Item	Symbol	Absolute Maximum Ratings	Unit
Forward Current	I_F	150	mA
Pulsed Forward Current	I_{FP}*	200	mA
Power dissipation	P_D	1	W
Operating Temperature	T_{OP}	-35~80	℃
Storage Temperature	T_{ST}	-40~85	℃
Junction Temperature	Tj	110	℃

** Condition for I_{FP} 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.

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.

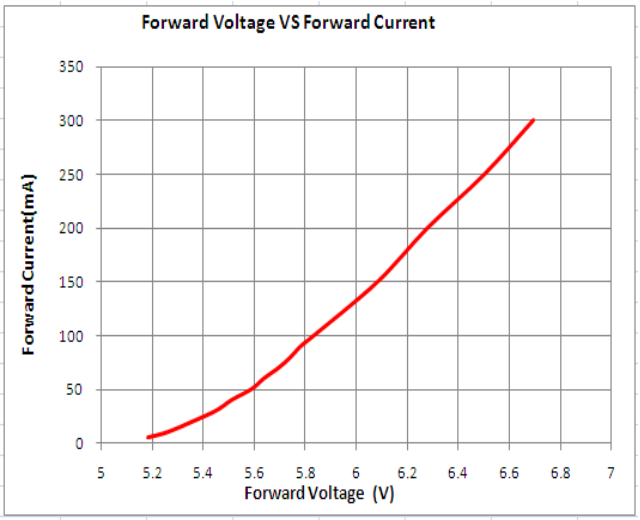
(4). The LEDs must be used within seven days after unpacked. Unused products must be repacked in an anti-electrostatic package, folded to close any opening and then stored in a dry and cool space.

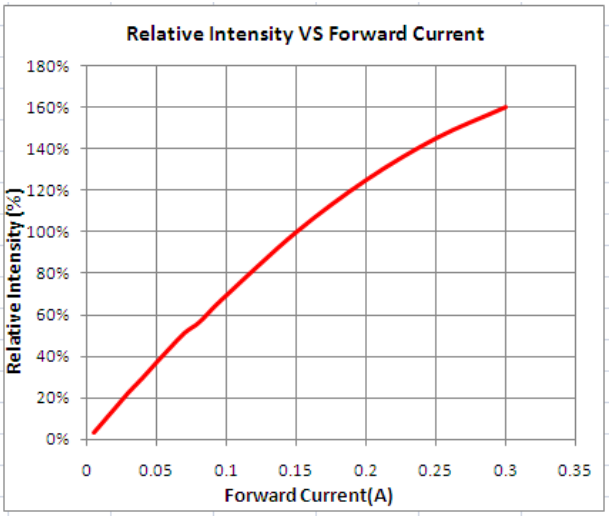
(5). The appearance and specifications of the products may be modified for improvement without further notice.

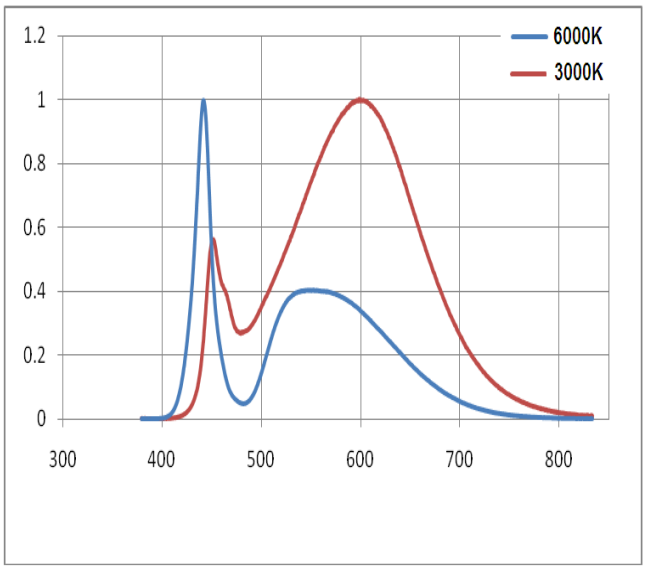
(6). The LEDs are sensitive to the static electricity and surge. It is strongly recommended to

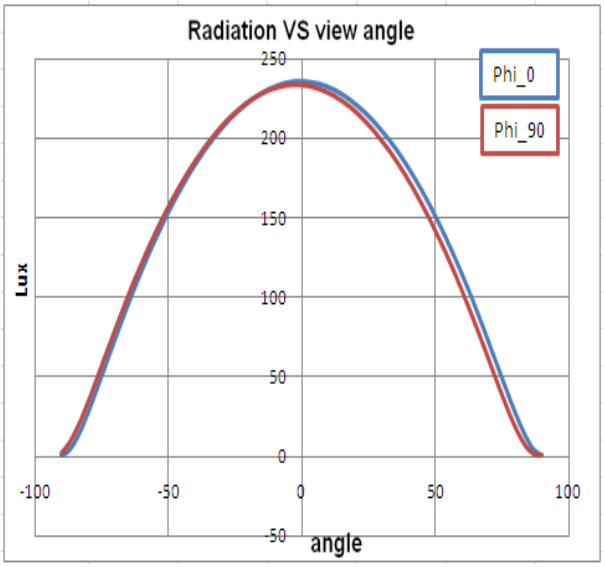
use a grounded wrist band and anti-electrostatic glove when handling the LEDs.
If a voltage over the absolute maximum rating is applied to LEDs, it will damage LEDs.
Damaged LEDs will show some abnormal characteristics such as remarkable increase
of leak current, lower turn-on voltage and getting unlit at low current.

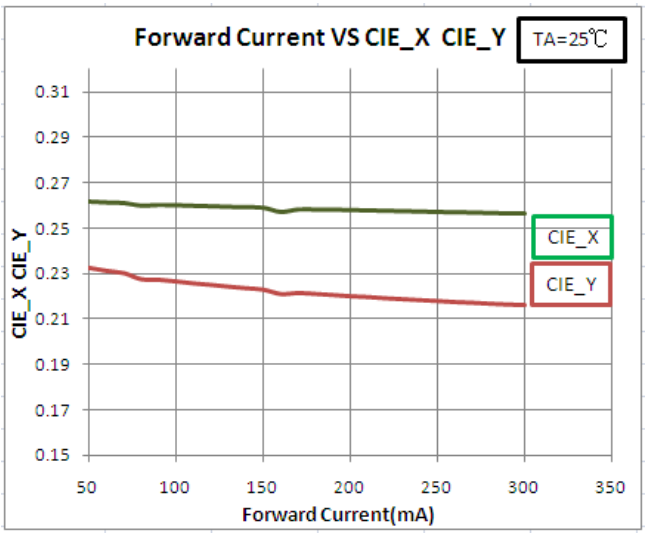
Characteristics

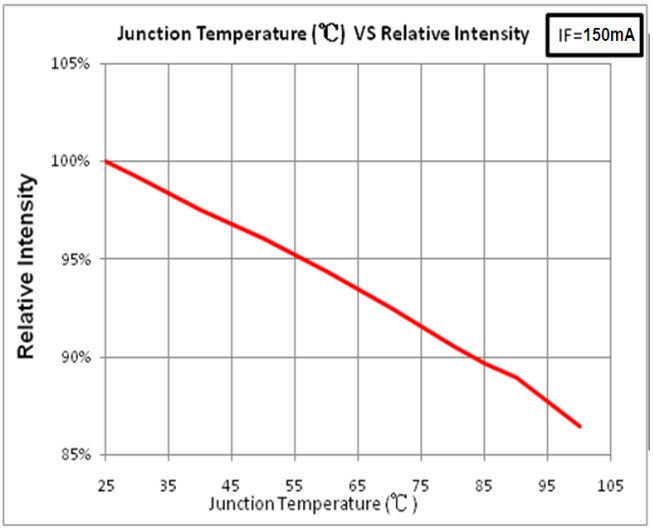


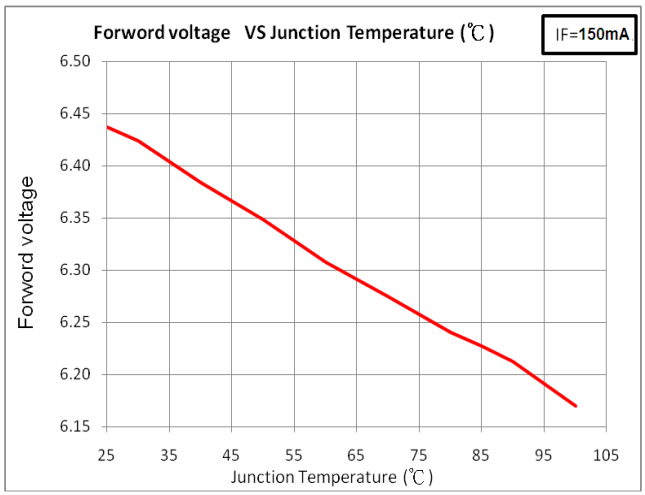


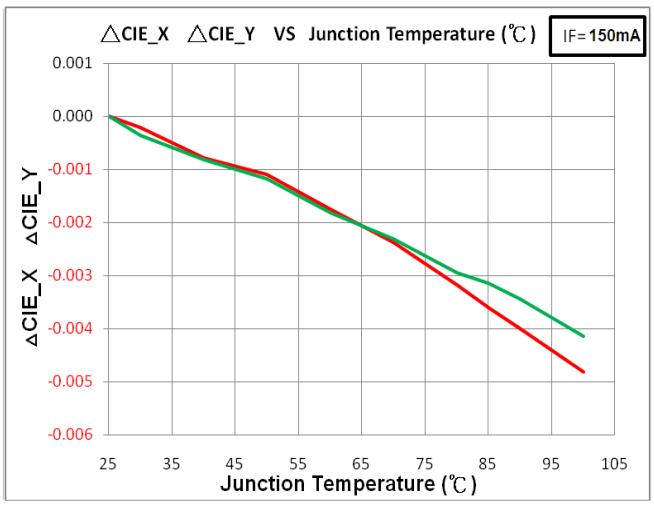


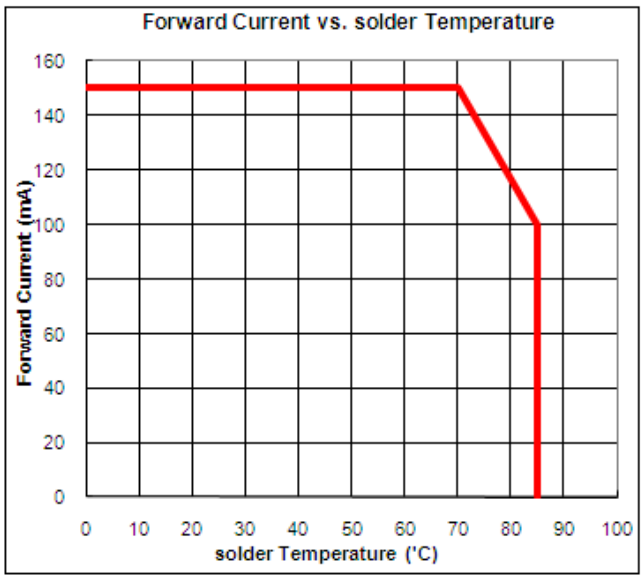



Forward Current VS CIE_X CIE_Y
TA=25℃
CIE_X CIE_Y
0.31
0.29
0.27
0.25
0.23
0.21
0.19
0.17
0.15
50
100
150
200
250
300
350
Forward Current(mA)
CIE_X
CIE_Y

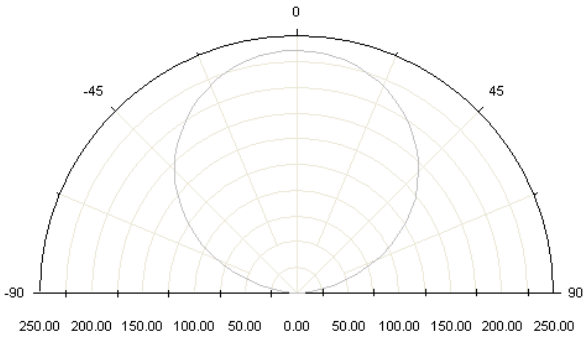

Junction Temperature (℃) VS Relative Intensity
IF=150mA
Relative Intensity
105%
100%
95%
90%
85%
25
35
45
55
65
75
85
95
105
Junction Temperature (℃)


Forword voltage VS Junction Temperature (℃)
IF=150mA
Forword voltage
6.50
6.45
6.40
6.35
6.30
6.25
6.20
6.15
25
35
45
55
65
75
85
95
105
Junction Temperature (℃)

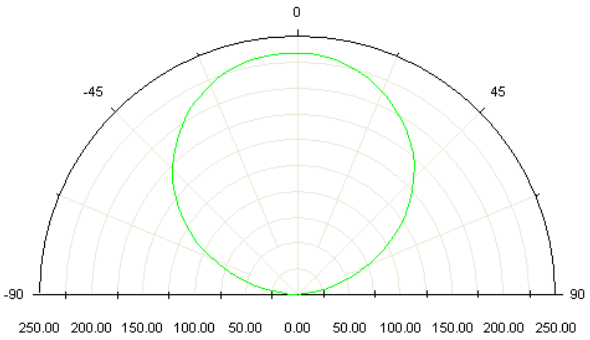

△CIE_X △CIE_Y VS Junction Temperature (℃)
IF=150mA
△CIE_X △CIE_Y
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
25
35
45
55
65
75
85
95
105
Junction Temperature (℃)


Forward Current vs. solder Temperature
Forward Current (mA)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
solder Temperature ('C)

Directive Characteristics



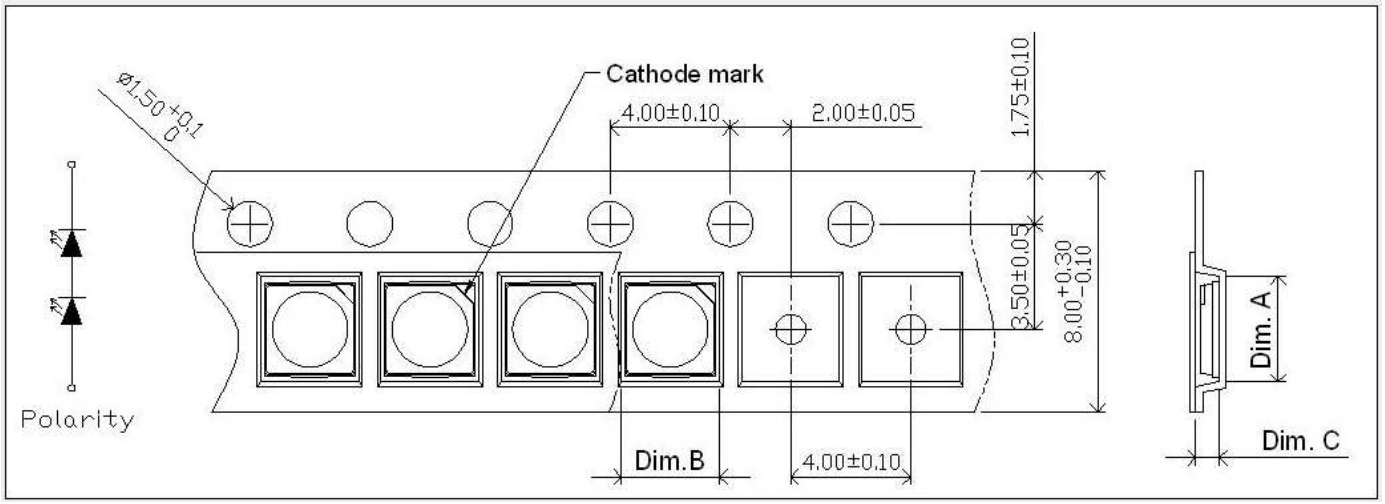
Directive Characteristics



Reliability Test List

RA Test (Preconditioning acc.to.Jedec Level 1)			
Test items	**Test condition**	**Duration**	**Sample Size**
Resistance to Soldering Heat(RTSH	IR-Reflow,260 ◦ C	1x/2x/3x	36
Temp. Cycle Test (TCT)	-40/100 ◦ C	0/100/300 Cycles	36
High Temp. with Bias(HTB)	85 ◦ C,If= 150mA	0/100/300/500/1000hrs	36
Temp. & Humidity with Bias (THB)	60 ◦ C/90%,If= 150mA	0/100/300/500/1000hrs	36
Temp. & Humidity with Bias (THB)	85 ◦ C/85%,If= 150mA	0/100/300/500/1000hrs	36
High Temp. Storage (HTS)	100 ◦ C	0/100/300/500/1000hrs	36
Low Temp. Storage (LTS)	-40 ◦ C	0/100/300/500/1000hrs	36
Pulse Life Test(PLT)	TA=25℃，tp=10ms DC=0.1 D=tp/T IF=500mA	0/100/300/500/1000hrs	36
Thermal Shock Test (TST)	-40/85 ◦ C	0/100/500 Cycles	36
Operating Life Test (OLT)	25 ◦ C,If= 150mA	0/100/300/500/1000hrs	36
ESD(HBM)	(Human Body Model)	0/1KV/2KV/5KV	36
Sulphur Test(硫化測試)	30 ◦ C/70% Mixed gas with H2S0.75PPM NO2,1.5PPM	0/168HRS	36
Ag Migration	85 ◦ C/85% Vr=50	0/100/300/500/1000hrs	36

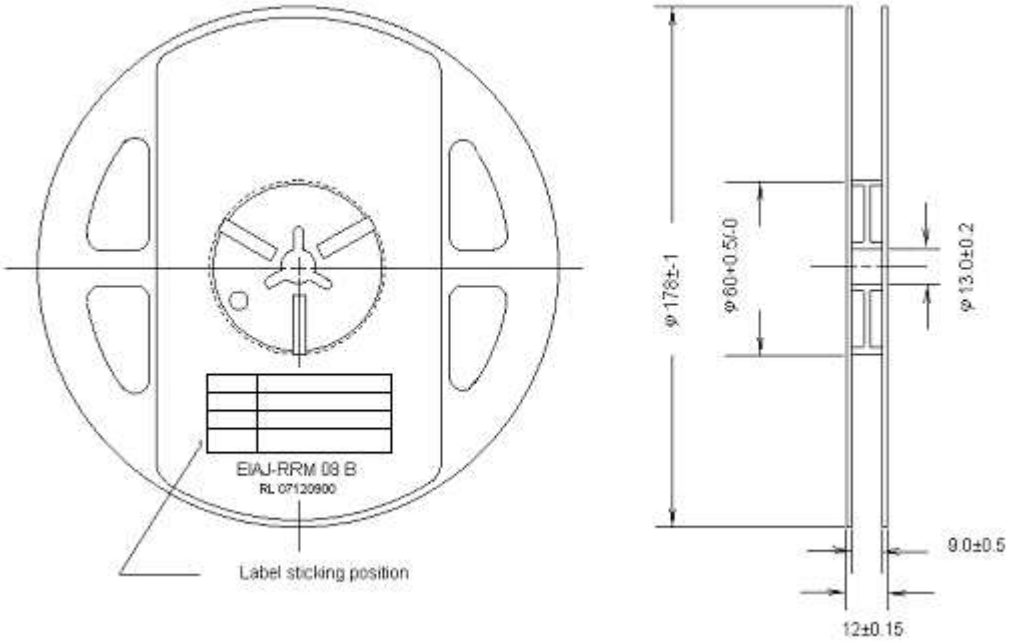
Tape Dimension



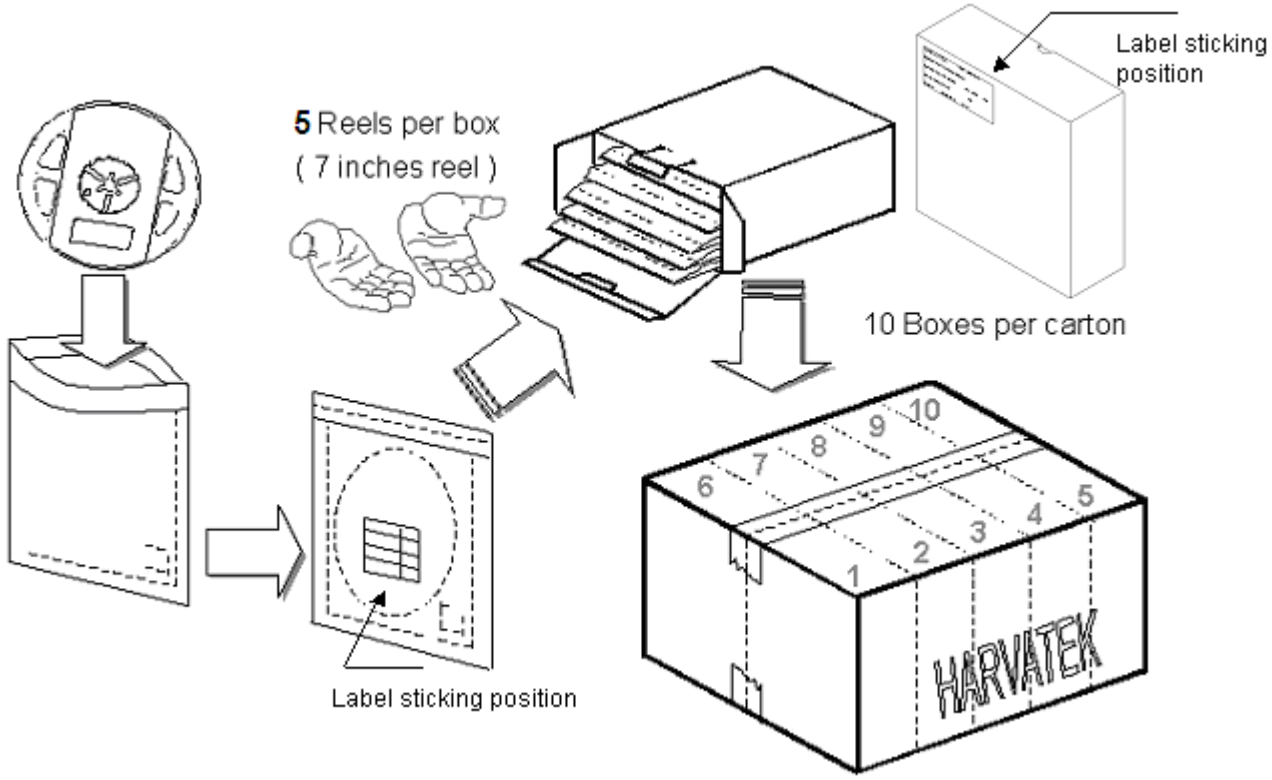
Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-T3212	3.49±0.1	3.26±0.1	0.78±0.1	2K

Unit: mm

Reel Dimension



Packing



5 boxes per carton is available depending on shipment quantity.

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

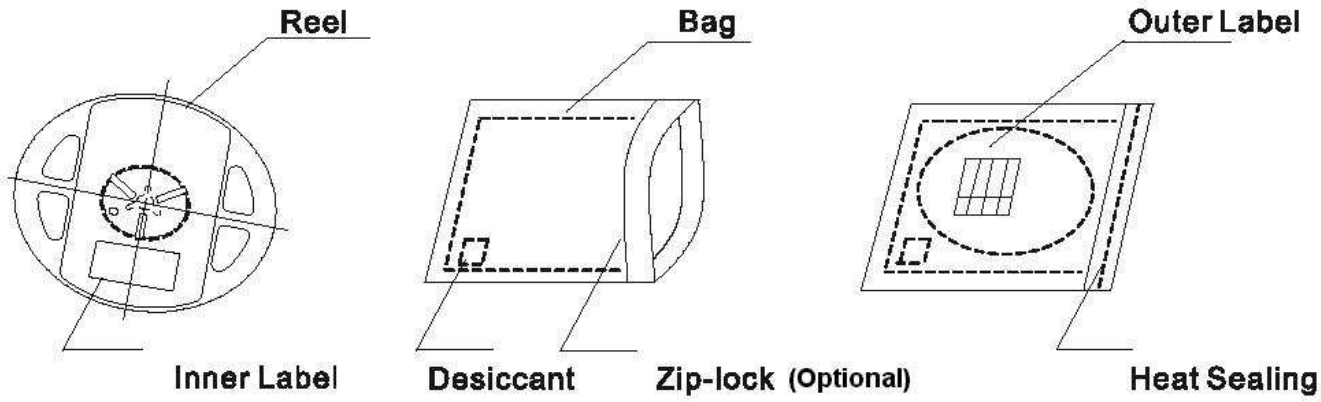
Any application should refer to the specifications of absolute maximum ratings.

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.

The package



Storage

It's recommended to store the products in the following conditions:

Humidity: 60 %RH Max.

Temperature: 5 ^{O}C ~30 ^{O}C (41^{O}F~86 ^{O}F)

1 Shelf life in sealed bag: 12 month at<40 ^{O}C and <90%RH. (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 ≦ 30 ^{O}C /60% RH, or

2.2 Stored at ≦ 20% 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 ±3^{O}C×(12~24hrs) and < 5% RH, taped reel type
100±3^{O}C×(45min~1hr), bulk type
130±3^{O}C×(15~30min), 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 ^{O}C±5 ^{O}C Max.(25W)
It's banned to load any stress on the resin during soldering.
Soldering time : 3±1sec

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 mot be used to pierce the sealing compound.

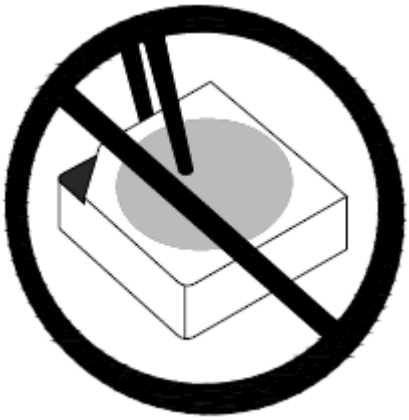


Figure 1

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.

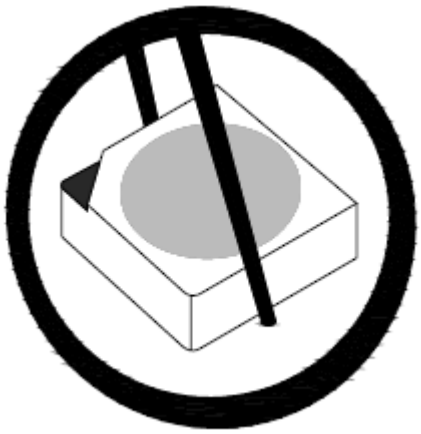


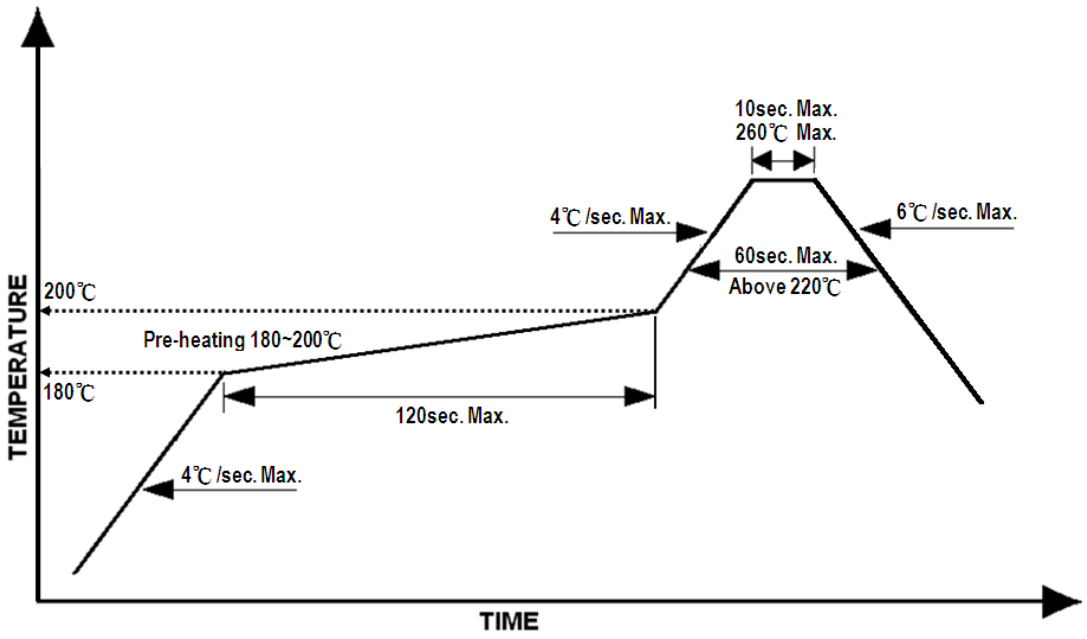
Figure 2

When populating boards in SMT production, there are basically no restrictions regarding the from 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.

Reflow Soldering

1. Recommend soldering paste specifications:
2. Operating temp.: Above 220 ^{O}C ,60sec
3. Peak temp.:260 ^{O}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 ^{O}C×30sec, or <30 ^{O}C×3min

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

Curing: 100 ^{O}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.

Revision History

Changes since last revision	Page	Version No.	Revision Date
New spec		1.0	2013/4/11