Harvatek Surface Mount CHIP LED Data Sheet
HT-T169DND

DISCLAIMER

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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.

Product Specifications

	Specification	Material	Quantity
Iv	As page 6 @20mA/ Ta= 25^{O} ;Tolerance: ±7%		
Chromaticity Coordinate	As page 7 & 8 @20mA/ Ta= 25^{O} C Tolerance: ± 0.1%		
Vf	2.7-3.4 (0.1 Bin) @20mA/ Ta= 25^{O} C ;Tolerance: ± 0.05V		
Ir	< 100 µA @ V_R = 5 V		
Resin	White	Silicon Resin	
Carrier tape	EIA 481-1A specs	Conductive black tape	2000pcs per reel
Reel	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	Non-specified

Others:

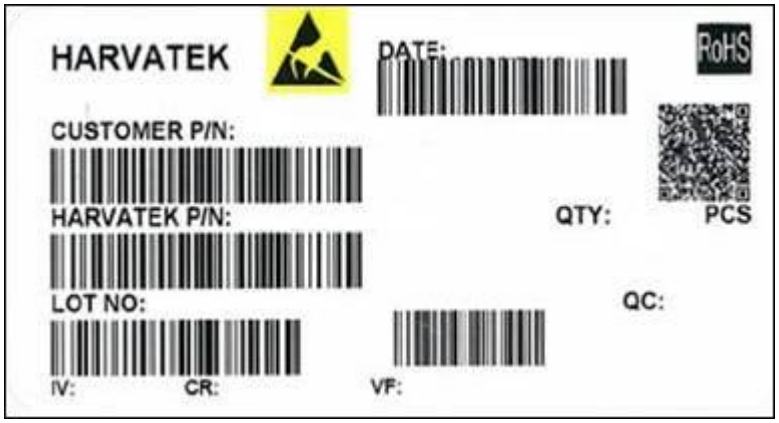
Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of Iv, λ_D and Vf. Each reel has a label identifying its specification; the immediate box consists of a product label as well.

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.

Label Specifications



■Customer P/N: To Be Defined

■ Harvatek P/N:

H T - T 1 6 9 DND

Series Name	Emitting Color
HT-T169 (PLCC2 LED)	DND
3.5(L)x2.8(W)x1.9(H)mm	White CRI>80
Single chip	Each chip @ 20mA

■ 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 (mcd)
Pure White	Z61	2010-2125 mcd
	Z62	2125-2250 mcd
	Z71	2250-2385 mcd
	Z72	2385-2530 mcd
	Z81	2530-2685 mcd
	Z82	2685-2850 mcd
	Z91	2850-3020 mcd

Luminous Intensity Measurement Allowance is ±7%

Color Temperature		Iv Bin		
Min.	Max.	Min.	Typ.	Max.
2750K	3750K	Z61	Z71	Z82
3750K	6750K	Z52	Z72	Z91
6750K	9500K	Z61	Z71	Z91

■ Forward Voltage (Vf) Bin:

Color	Bin Code	Spec. Range
White	G4	2.7-2.8
	H1	2.8-2.9
	H2	2.9-3.0
	H3	3.0-3.1
	H4	3.1-3.2
	J1	3.2-3.3
	J2	3.3-3.4

Forward Voltage Measurement Allowance is ±0.05V

Color Bin:

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	0.3765
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

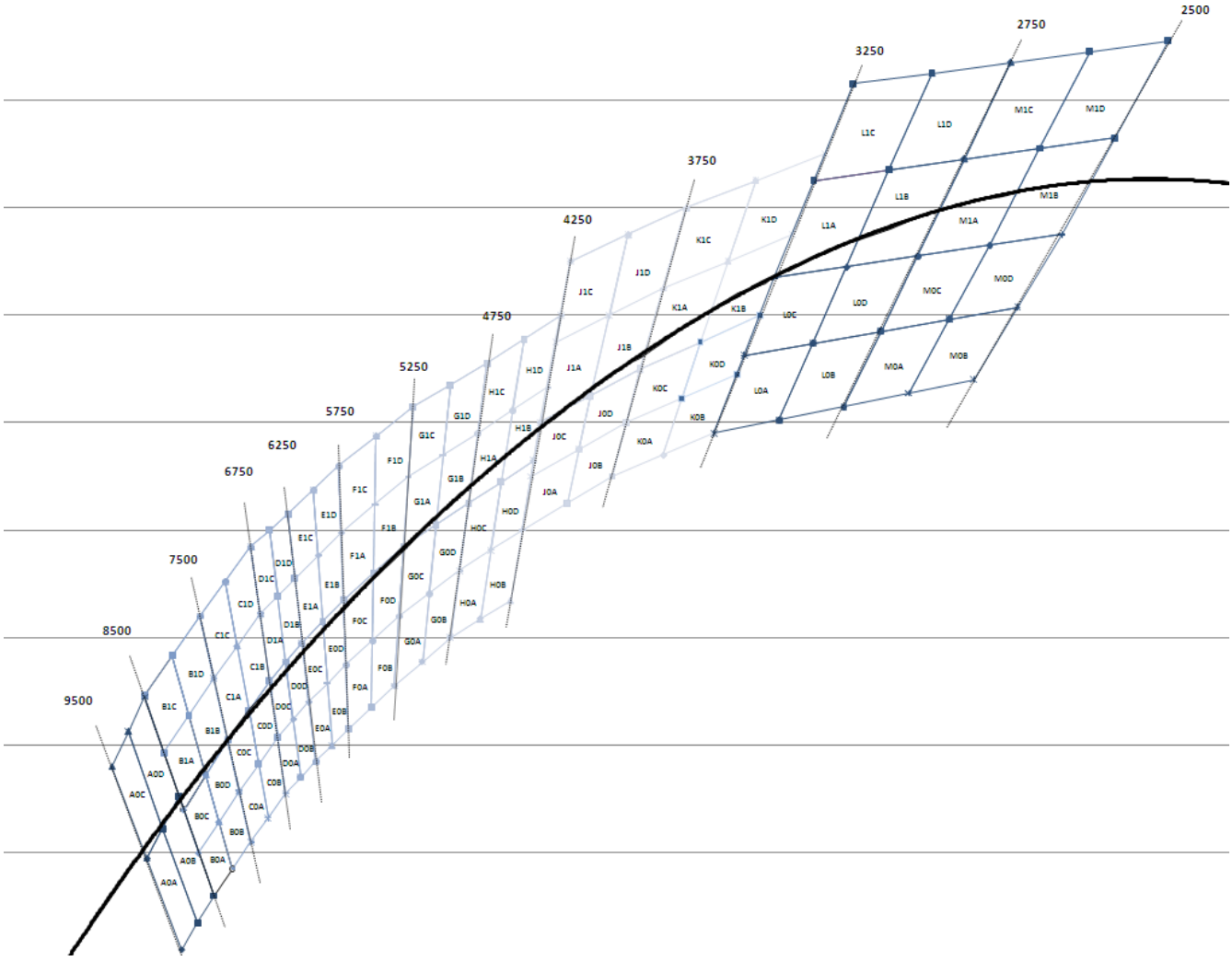
J0A	3750~4000K	J1A	3750~4000K	J0B	3750~4000K	J1B	3750~4000K	J0C	4000~4250K	J1C	4000~4250K	J0D	4000~4250K	J1D	4000~4250K
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.3645	0.35	0.3685	0.37	0.37425	0.355	0.37925	0.375	0.37925	0.375	0.3875	0.405	0.39	0.38	0.4	0.41
0.3685	0.37	0.375	0.4	0.37925	0.375	0.3875	0.405	0.3685	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	0.38925	0.47150	0.39150	0.46550	0.40300	0.48100	0.40500	0.47625	0.42100	0.49250	0.42300
0.43400	0.37300	0.44800	0.37550	0.44200	0.38700	0.45675	0.38925	0.45000	0.40100	0.46550	0.40300	0.46000	0.41900	0.47625	0.42100

Chromaticity Coordinate:



Product Features

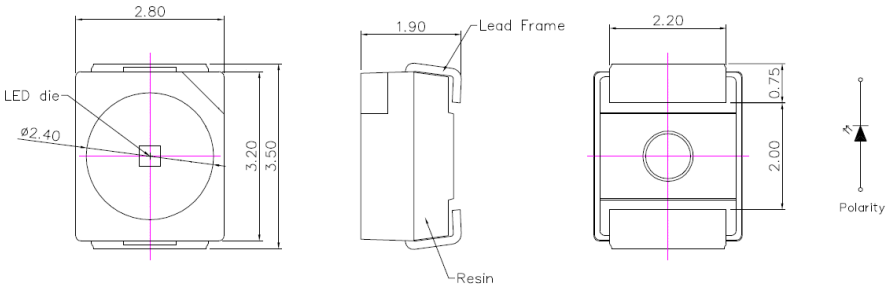
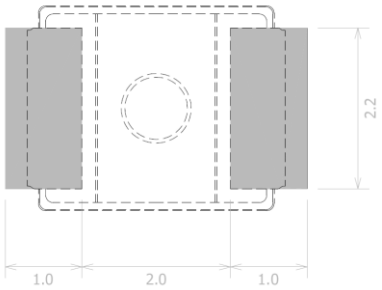
Electro-Optical Characteristics

(I_F @ 20mA, T_a 25 °C)

Code for parts	Lighting Color		V_F(V)		Color	I^*_V(mcd)
			typ	max	Correlated Color Temperature	Typical
HT-T169DND	White	InGaN	2.9	3.4	2750~9500K	2300

Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

Outline Dim.	Soldering Pattern
	
Soldering terminals may shift in the x, y direction.	

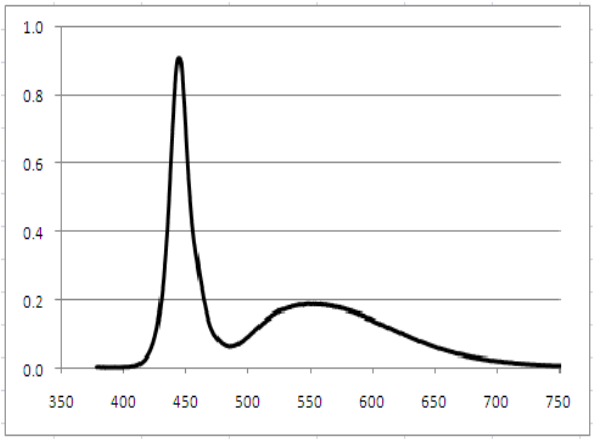
Absolute Maximum Ratings

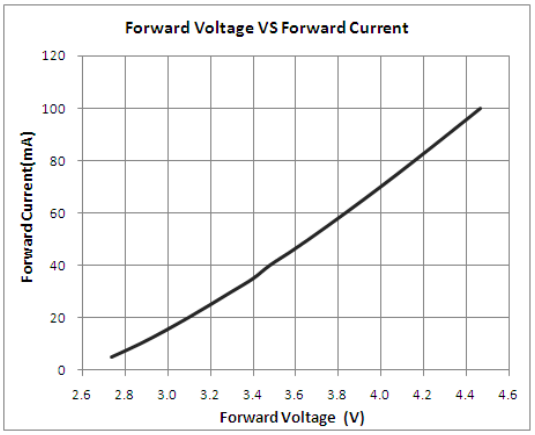
Series	P_d (mW)	I_F (mA)	I_{FP} (mA)**	V_R (V)	I_R (uA)	T_{OP} (°C)	T_{ST} (°C)
T169DNC	88	20	100	5	<100@ V_R = 5	-30~+80	-40~+85

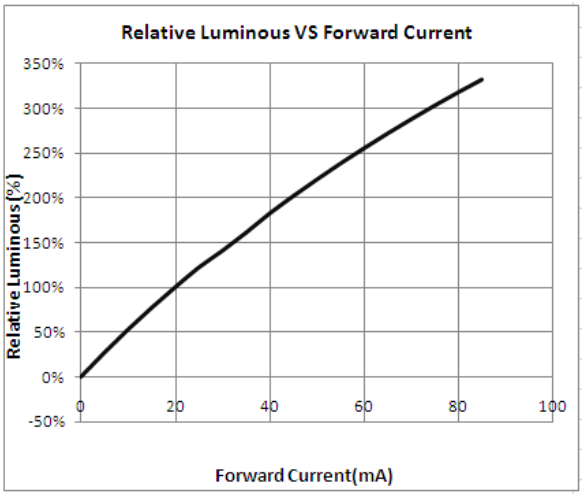
** Condition for I_{FP} is pulse of 1/10 duty and 0.1msec width

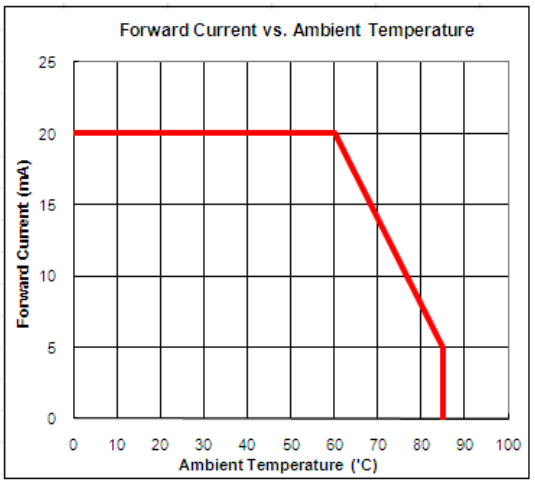
**Remarks:This product should be operated in forward bias.If a reverse voltage is continuously applied to the product, such operation can cause migration resulting in LED damage.

Characteristics of HT-T169DND

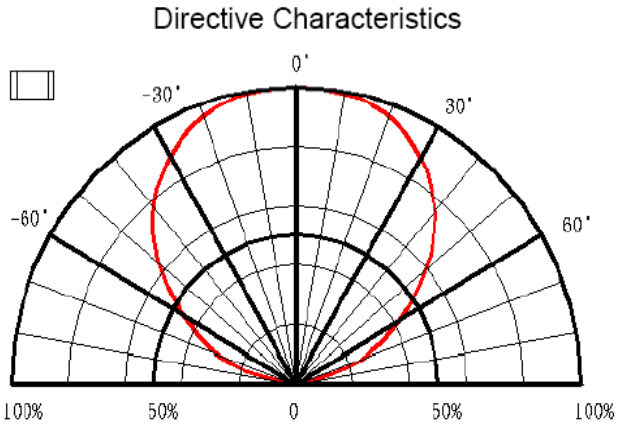


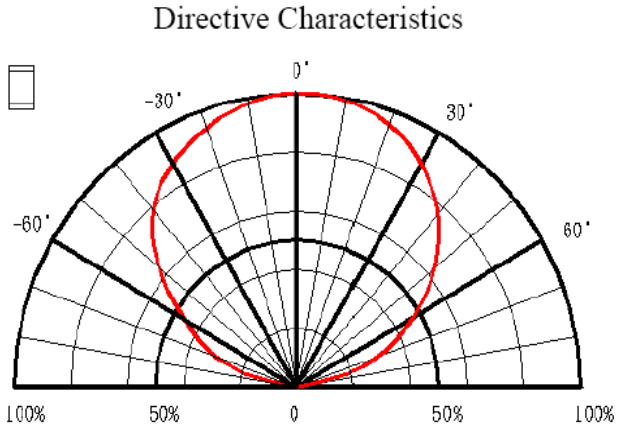






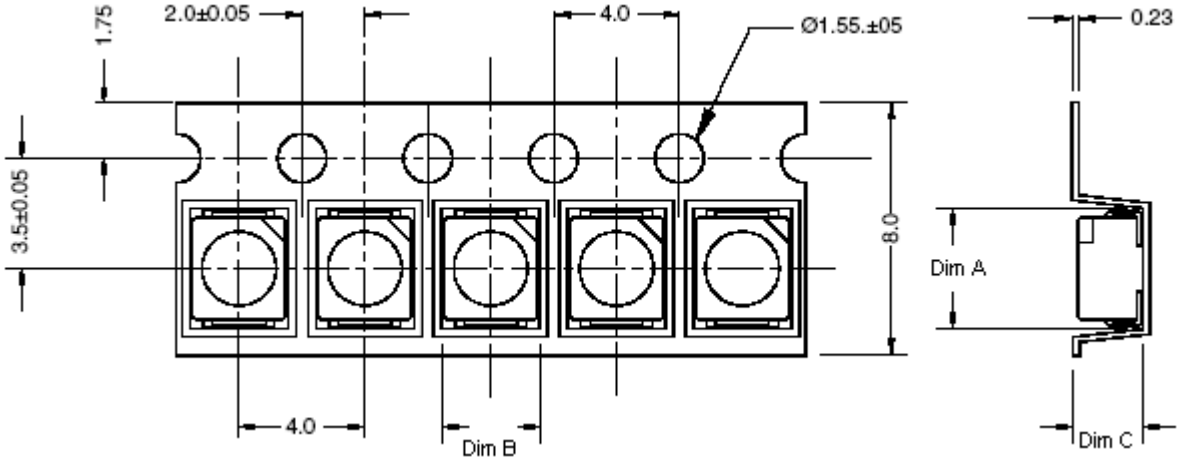
■ Radiation Pattern





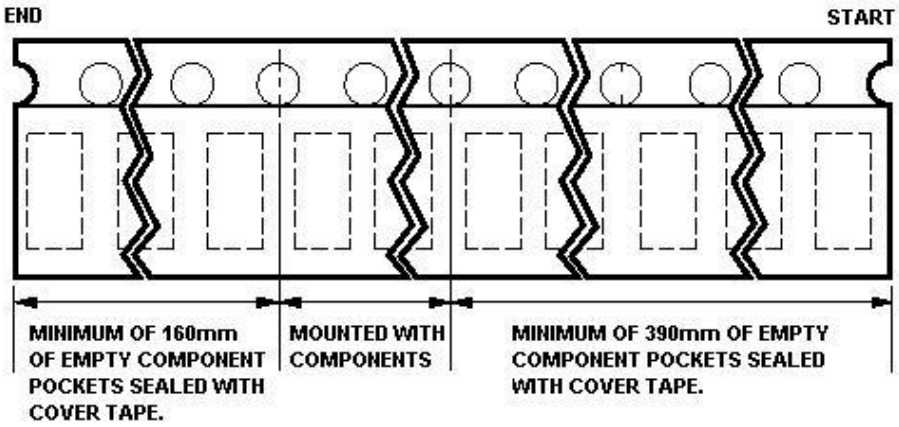
Packaging

Tape Dimension

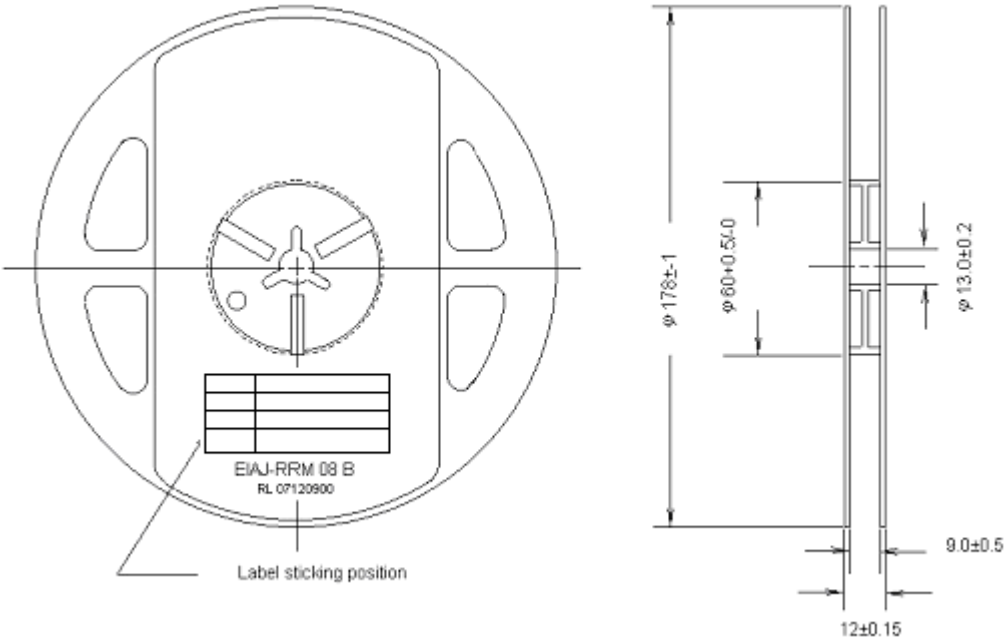


Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-T169	3.73±0.10	2.95±0.10	2.12±0.10	2K

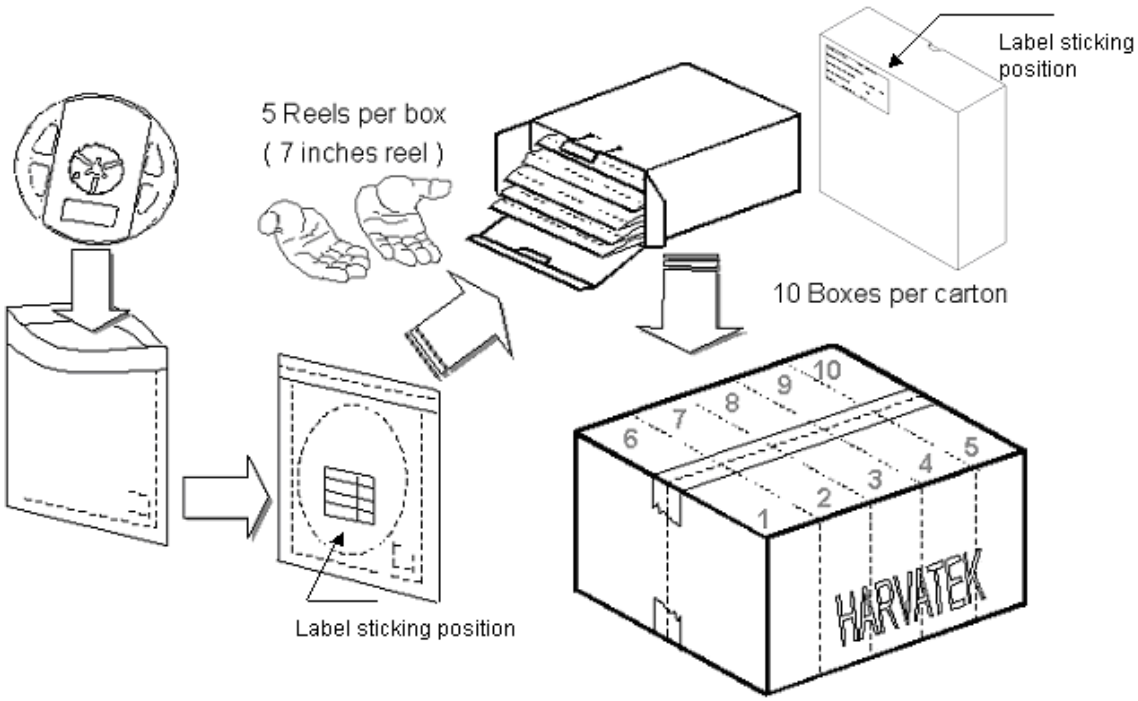
Unit: mm



Reel Dimension



Packing



5 boxes per carton is available depending on shipment quantity.

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 ≦30℃/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.

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

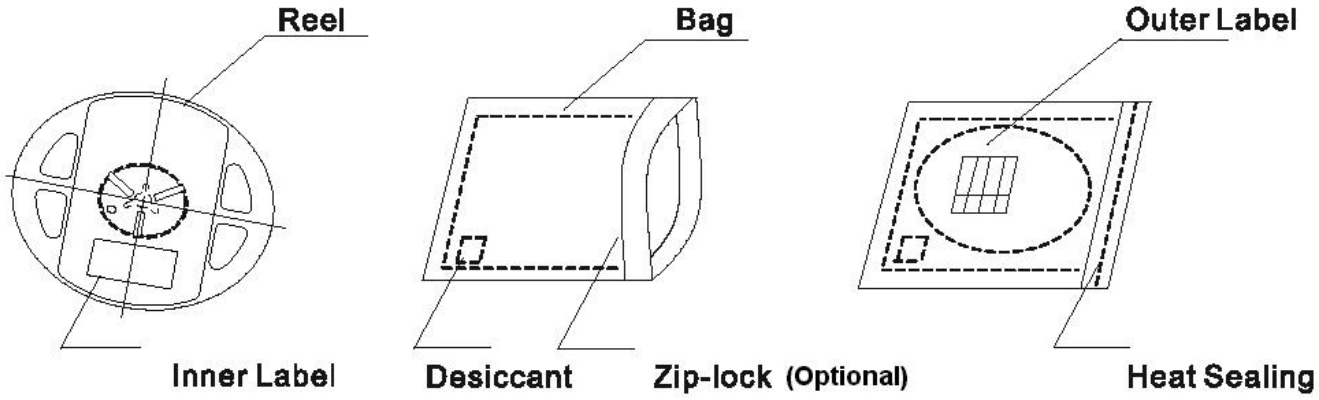
Any application should refer to the specifications of absolute maximum ratings.

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.

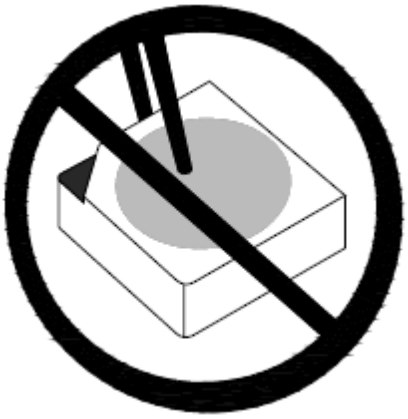


Figure 1

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.

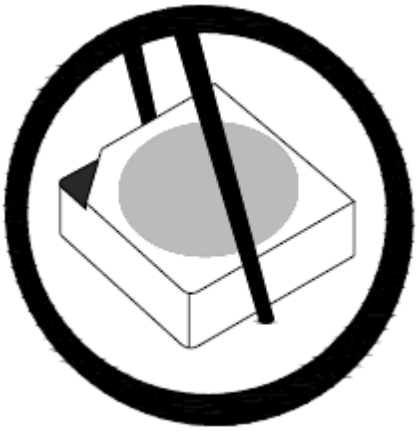


Figure 2

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.

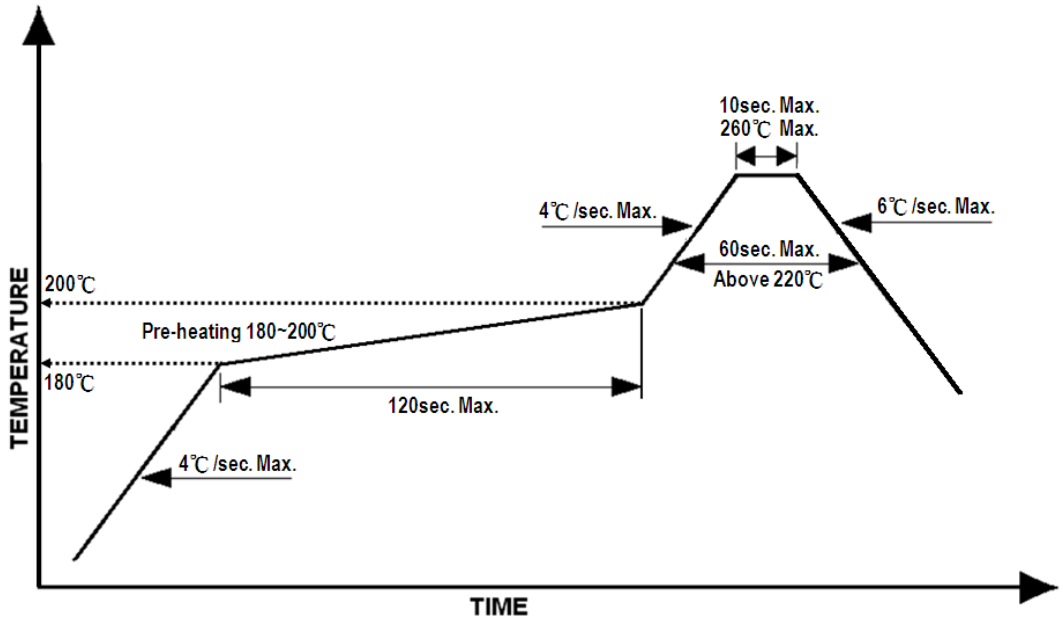
This is assured by choosing a pick and place nozzle which is large than LEDs reflector area.

Reflow Soldering

Recommend soldering paste specifications:

1. Operating temp.: Above 220 ^{O}C ,60 sec.
2. Peak temp.:260 ^{O}CMax.,10sec Max.
3. Never attempt next process until the component is cooled down to room temperature after reflow.
4. 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^{o}C x 30sec. or <30^{o}C x 3min
- Ultrasonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 ^{O}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.
- Electric-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended

Revise History

Rev.	Descriptions	Date	Page
1.0	-	2012/08/21	-