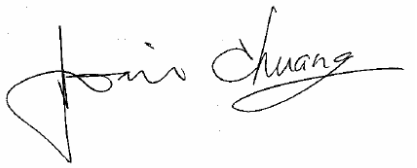
# Harvatek Surface Mount CHIP LEDs Data Sheet
# Model: HT-V116NB

**Acknowledged by**

**Section Manager**
**Production Engineering Dept.**



**Manager**
**Production Engineering Dept.**

## 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 making an 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 |
|---|---|---|---|
| Iv | 140-400mcd<br>@20mA/ Ta= 25$^{O}$ C<br>Tolerance: ± 10% | | |
| Chromaticity Coordinates | 464-480nm<br>@20mA/ Ta= 25$^{O}$ C<br>Tolerance: ± 0.01 | | |
| Vf | 2.7~3.6V (0.1V/BIN)<br>@20mA/ Ta= 25$^{O}$ C<br>Tolerance: ± 0.05V | | |
| 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 |
| | Specification | Material | Quantity |

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. Parts built with 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 protected from ESD during all the process.

## Product Characteristics

### Electro-Optical Characteristics

($I_F$ @ 20mA, $T_a$ 25°C)

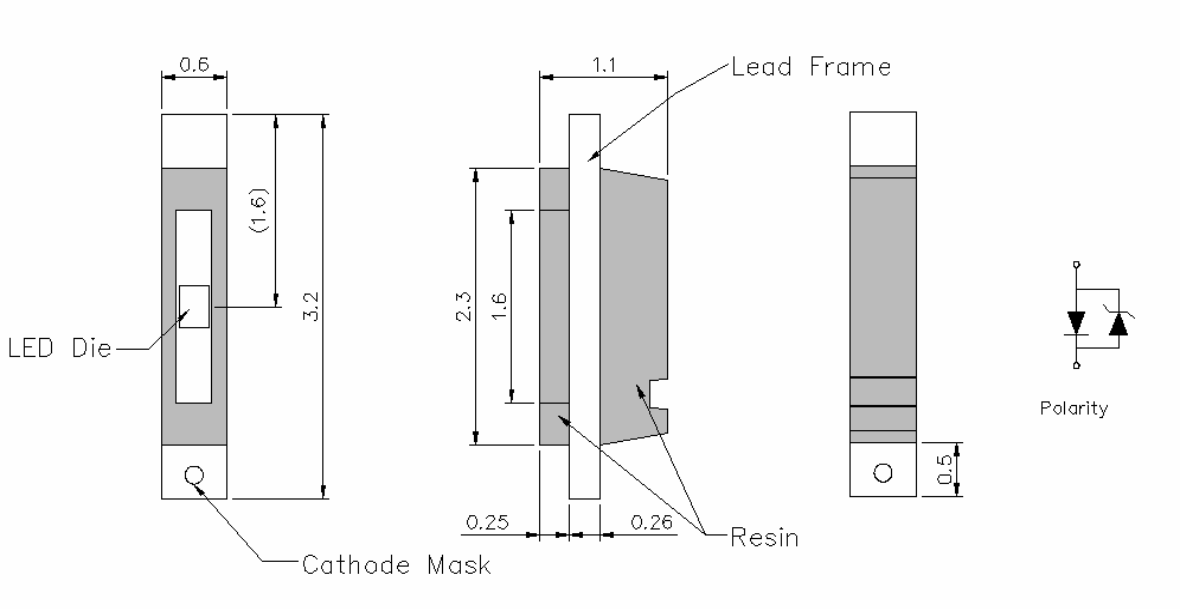
| Product No. | Lighting Color | Material | $V_F$(V) | | λ (nm) | | | $I^*_V$(mcd) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | min | max | $\lambda_D$ | $\lambda_P$ | △λ | min | typ | max |
| HT-V116NB | Blue | InGaN | 2.7 | 3.6 | X=0.30<br>Y=0.31 | -- | -- | 140 | 250 | 400 |

* Per NIST standards

### Package Outline Dimension

Unit: mm Tolerance: +/-0.1

Outline Dimension：




Unit: mm

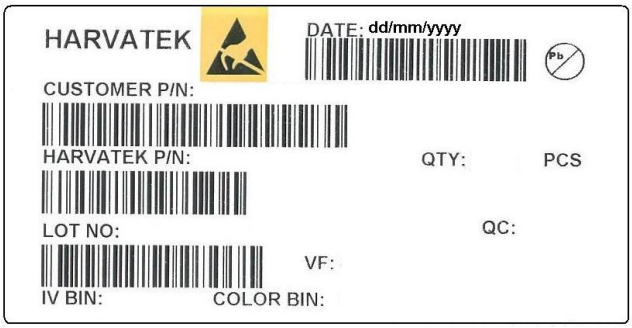
### Absolute Maximum Ratings

($T_a$ 25°C)

| Series | $P_d$ (mW) | $I_F$ (mA) | $I_{FP}$ (mA) | Ir (μA) @ $V_R$ = 5 V | $T_{OP}$ (°C) | $T_{ST}$ (°C) |
|---|---|---|---|---|---|---|
| HT-V116 InGaN | 108 | 30 | 100 | <1μA | -40~+85 | -40~+100 |

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

## Label Spec.




■ **Customer P/N: To Be Defined**

■ **Harvatek P/N**

**H T - V 1 1 6 NB**

| Series Name | Emitting Color |
|---|---|
| HT-V116: 3.2x1.1x0.6mm | NB: Blue |

■ **Lot No.**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| **P** | **1** | **2** | **2** | **3** | **0** | **A** | **-** | **D** | **T** |

| Code 1 | Code 2 | Code 3 | Code 4, 5 | Code 6, 7 | Code 9 | Code 10 |
|---|---|---|---|---|---|---|
| | Mfg. Year | Mfg. Month | Mfg. Date | Lots | Resin Color | Packaging |
| Internal Tracing Code | 1: 2001<br>2: 2002<br>3: 2003<br>4: 2004<br>….. | 1: Jan.<br>2: Feb.<br>….<br>9: Sep.<br>A: Oct.<br>B: Nov.<br>C: Dec. | 1~31/ (30) | 01~99, A,B,C… | D: Milky White | T: Taped Reel |

## Bin Code.

### ■ Iv Bin:

| Color | Bin Code | Spec. Range |
|---|---|---|
| Blue | R2 | 140-180mcd |
| | S1 | 180-226mcd |
| | S2 | 226-285mcd |
| | T1 | 285-320mcd |
| | T2 | 320-360mcd |
| | U1 | 360-400mcd |

**Luminous Intensity Measurement Allowance is ±10%**

### ■ Color Bin:

| Color | Bin Code | Spec. Range |
|---|---|---|
| Blue | B | 464-468nm |
| | C | 468-472nm |
| | D | 472-476nm |
| | E | 476-480nm |

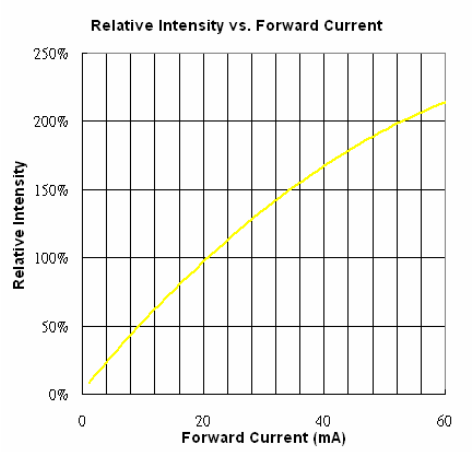
**Color Coordinates Measurement Allowance is ±0.01**

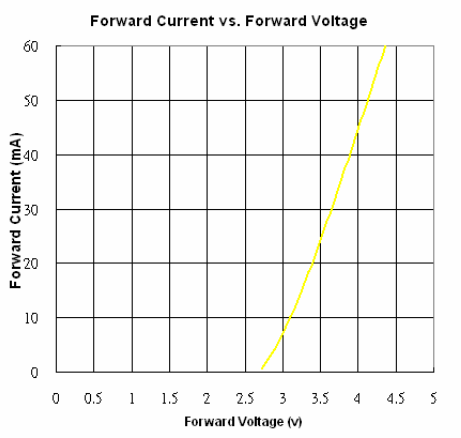
### ■ Vf Bin:

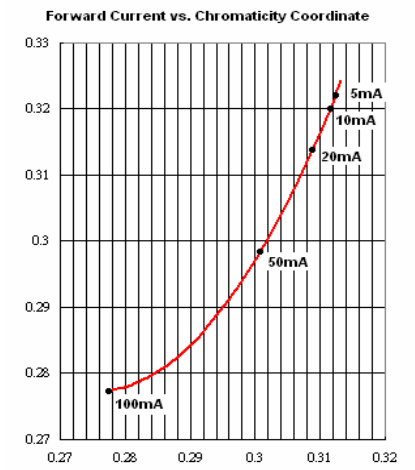
| Color | Bin Code | Spec. Range |
|---|---|---|
| White | G4 | 2.7-2.8V |
| | H1 | 2.8-2.9V |
| | H2 | 2.9-3.0V |
| | H3 | 3.0-3.1V |
| | H4 | 3.1-3.2V |
| | J1 | 3.2-3.3V |
| | J2 | 3.3-3.4V |
| | J3 | 3.4-3.5V |
| | J4 | 3.5-3.6V |

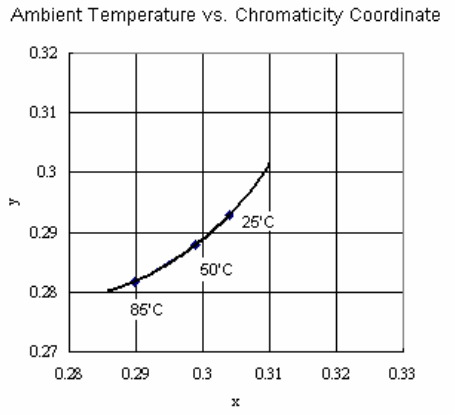
**Forward Voltage Measurement Allowance is ±0.05V**

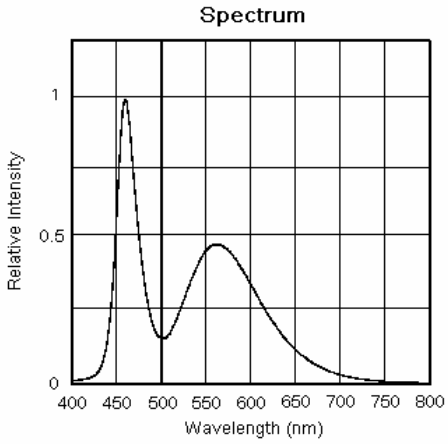
## Characteristics of HT-V116NB

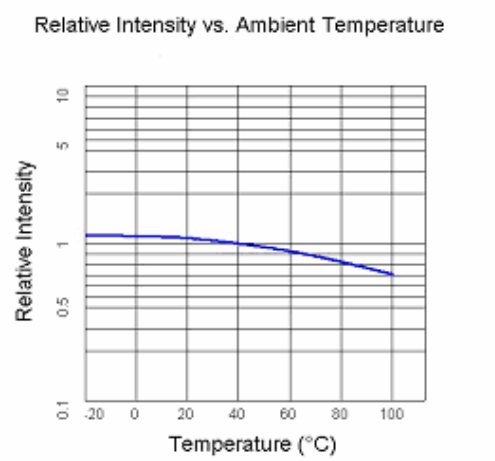


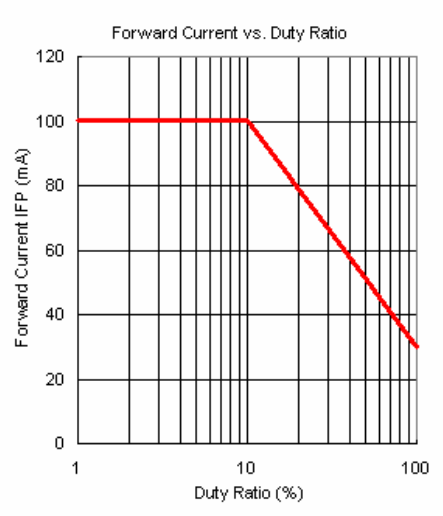



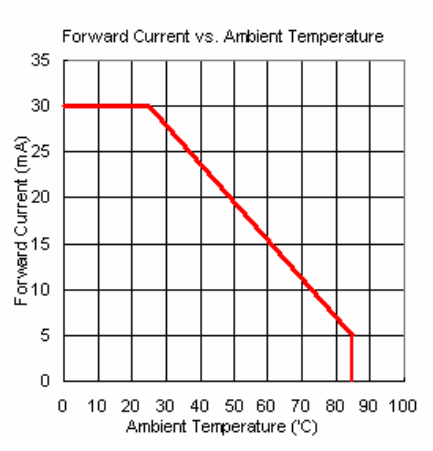



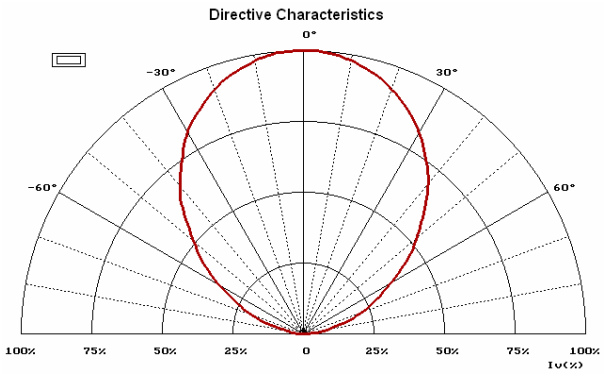



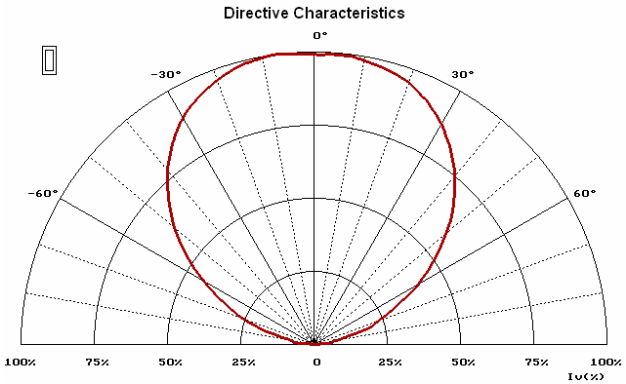

Spectrum
Relative Intensity
1
0.5
0
400 450 500 550 600 650 700 750 800
Wavelength (nm)


Relative Intensity vs. Ambient Temperature
Relative Intensity
10
5
1
0.5
0.1
-20 0 20 40 60 80 100
Temperature (°C)


Forward Current vs. Duty Ratio
Forward Current IFP (mA)
120
100
80
60
40
20
0
1
10
100
Duty Ratio (%)

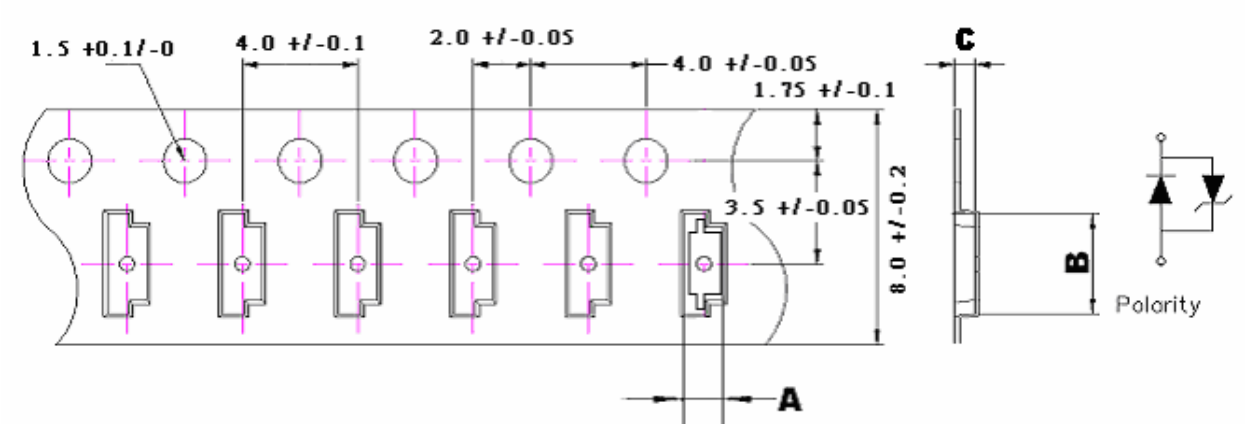

Forward Current vs. Ambient Temperature
Forward Current (mA)
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
Ambient Temperature (°C)


Directive Characteristics
0°
-30°
30°
-60°
60°
100% 75% 50% 25% 0 25% 50% 75% 100%
Iv(%)


Directive Characteristics
0°
-30°
30°
-60°
60°
100% 75% 50% 25% 0 25% 50% 75% 100%
Iv(%)

## Packaging Tape, Reel, and Packing Model

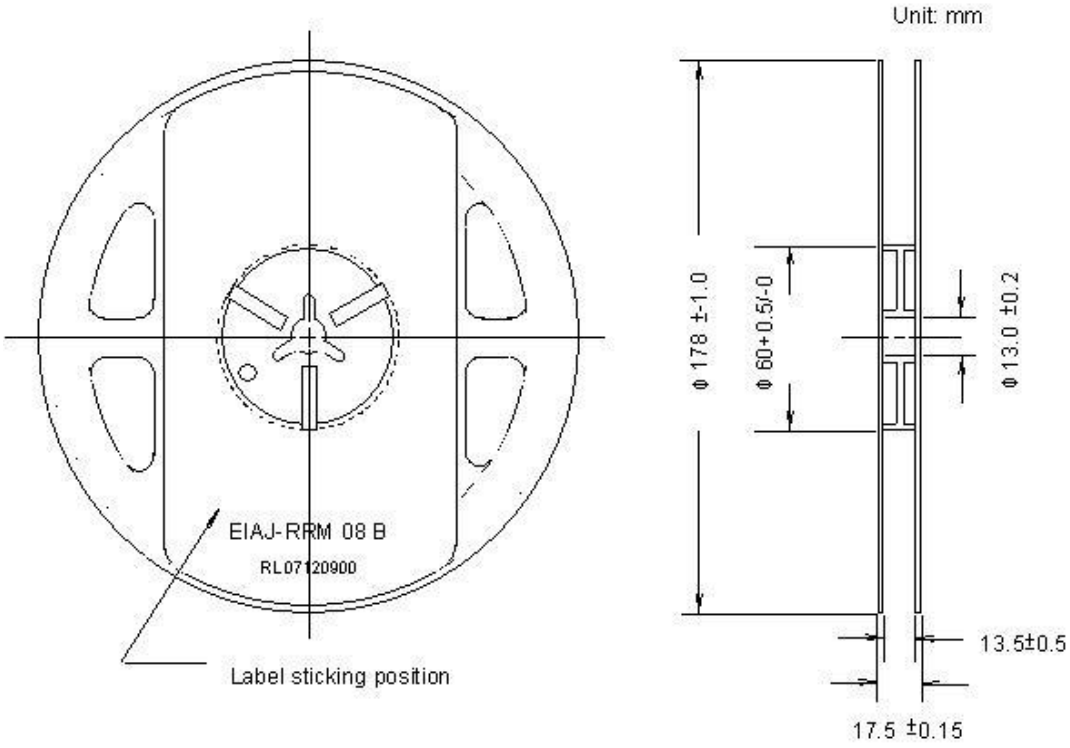
### Tape Dimension



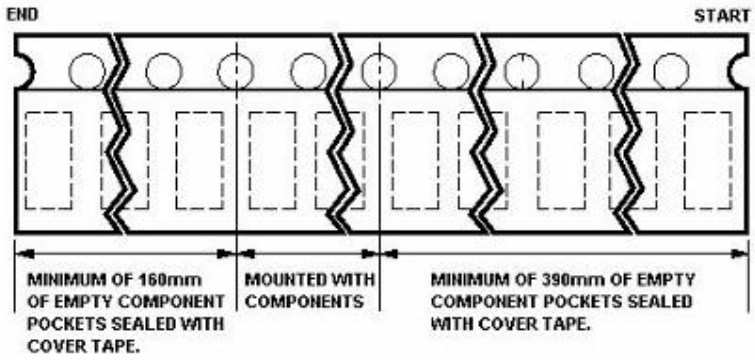

| Part No. | Dim. A | Dim. B | Dim. C | Q'ty/Reel |
|---|---|---|---|---|
| HT-V116 | 1.25±0.1 | 3.50±0.1 | 0.75±0.1 | 2K |

**Unit: mm**

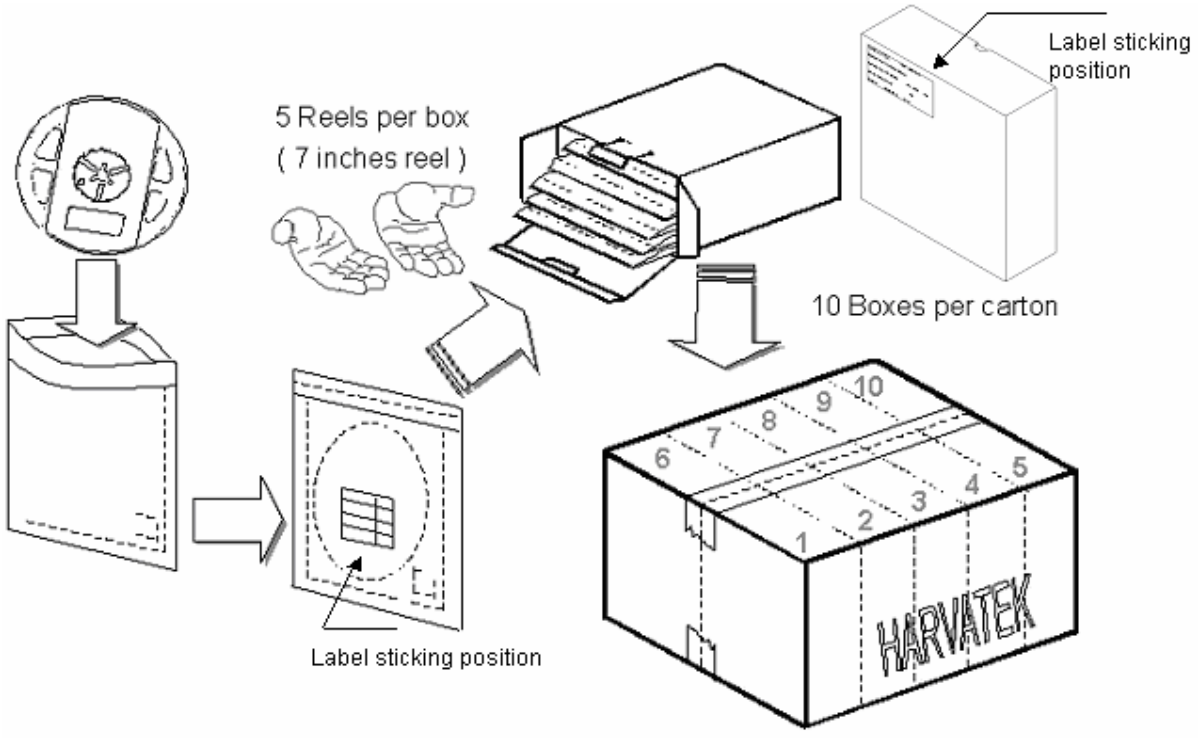
## Reel Dimension




## Tape Leader and Trailer Dimension



**Packing Model**




5 boxes per carton is available according to shipping quantity.

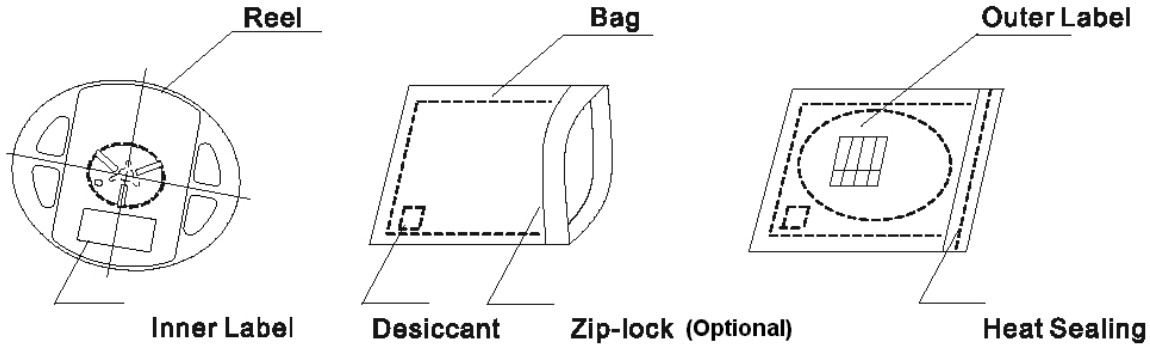
| Cardboard Box Size | Dimensions(cm) | Reel/box | Quantity/box (pcs) |
|---|---|---|---|
| Small | 45 x 26 x 30 | 25 reels Max. | 50, 000 Max |
| Large | 50 x 46 x 30 | 50 reels Max. | 100, 000 Max |

**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 is the following:




**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 when the pack is unsealed after 15 days. The conditions are as followings:

a) 60 ±3$^{O}$C×(12~24hrs) and < 5% RH, taped reel type

b) 100±3$^{O}$C×(45min~1hr), bulk type

c) 130±3$^{O}$C×(15~30min), bulk type

**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.

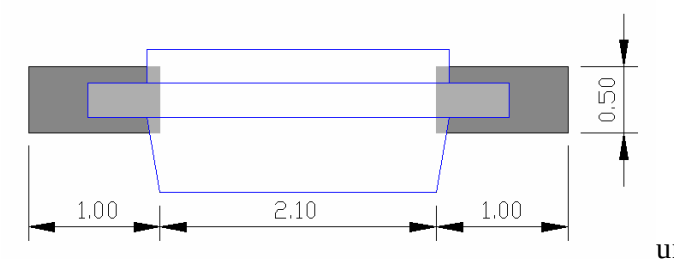
**PRECAUTIONS**

1. Avoid absorbing moisture at any time during transportation or storage.
2. Anti-Static process is needed especially when handling GaN, InGaN, and AlInGaP products.
3. It is suggested to connect the unit with a proper series current limit resistor. Avoid driving reverse voltage over the specification of LEDs when turning the unit ON/OFF.

4. Any application should refer to the specifications of absolute maximum ratings.
5. Avoid any direct contact with the viewing area.
6. If possible, assemble the unit in a clean room or dust-free environment.
7.

**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. Recommended soldering pattern is listed below.



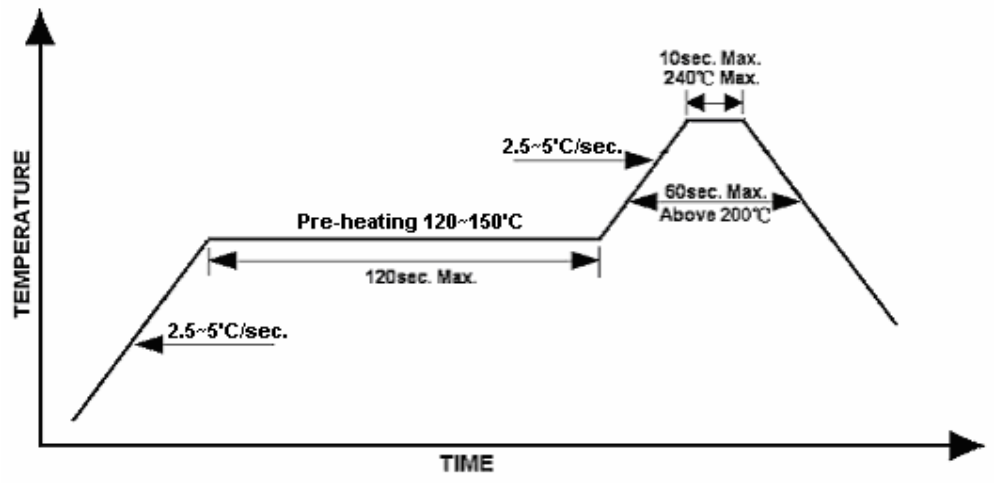

unit: mm

Soldering terminal may shift in x, y direction.

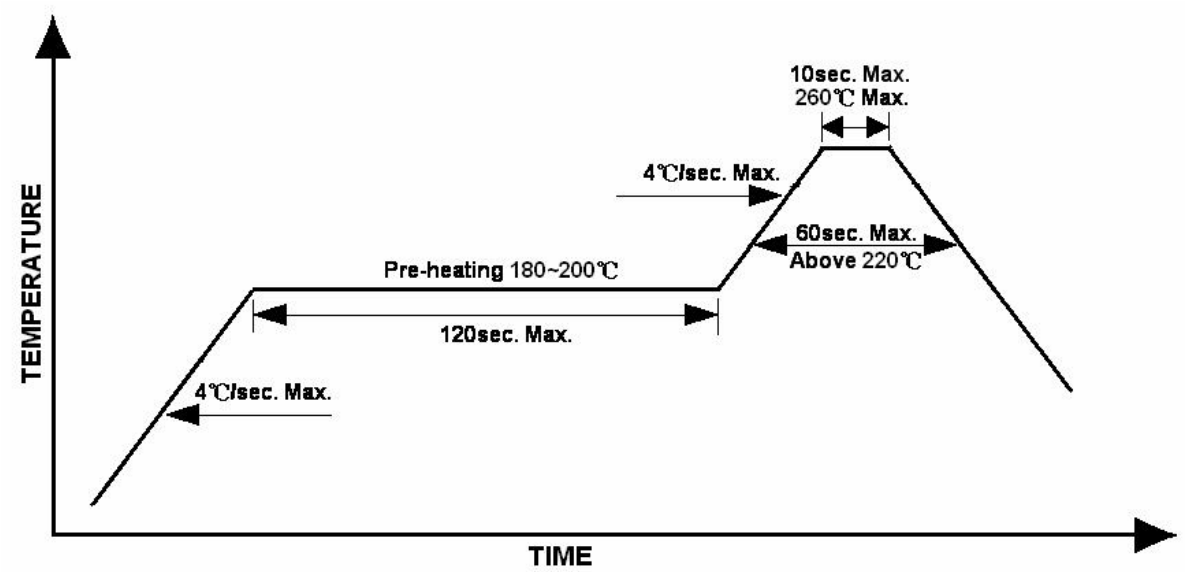
**Re-flow Soldering**

- Recommend tin glue specifications:
  Melting temperature: 178~192 $^{O}$C
- Never take next process until the component is cooled down to room temperature after re-flow.
- The recommended re-flow soldering profile (measuring on the surface of the LED resin) is following:

**Lead Solder**



**Lead-free Solder**




**Rework**

- Customer must finish rework within 5 sec. under 260 $^{O}$C.
- The head of iron cannot touch copper foil.
- Twin-head type is preferred.

**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.

**Reliability**

Test Items and results

| Test Item | Standards reference | Conditions | Note | Failures/ Sample size |
|---|---|---|---|---|
| Solderability | JESD22-B102-B and CNS-5068 | Accelerated aging 155°C/ 24hrs<br>Tinning speed: 2.5±0.5cm/s<br>Tinning: A: 215°C/ 3±1s or B: 260°C/ 10±1s | Over 95% area | 0/22 |

| | | | | |
|---|---|---|---|---|
| Resistance to soldering heat (Reflow soldering) | JEITA ED-4701 300 301 | Tsld=260°C/10sec (Pre treatment 30°C/70%R.H. 168hrs) | 2 times | 0/100 |
| Temperature cycle | JESD-A104-A IEC 68-2-14, Nb | -40°C~25°C~85°C~25°C 15min.~5min.~15min.~5min. | 300cycle | 0/100 |
| High Temp. storage | JEITA ED-4701 200 201 | Ta=100°C | 1000h | 0/40 |
| Low Temp. storage | JEITA ED-4701 200 202 | Ta=-40°C | 1000h | 0/40 |
| Temp. humidity storage | JEITA ED-4701 100 103 | Ta=60°C, RH=90% | 1000h | 0/40 |
| Vibration | JEITA ED-4701 400 403 | 100~2000~100HZ Sweep 4min. 200m/s$^2$ 3 direction, 4 cycles | 48min. | 0/50 |
| COQ | | | 300cycle | 0/100 |
| PCT | | | 96h | 0/100 |
| JEDEC level 1 | | | | 0/100 |
| Steady state operation | | Ta=25°C, If=20mA | 1000h | 0/40 |
| High Temp. operation | | Ta=55°C, If=20mA | 1000h | 0/40 |
| Low Temp. operation | | Ta=-40°C, If=20mA | 1000h | 0/40 |
| High Temp. & Humidity operation 1 | | Ta=85°C, RH=85%, If=5mA | 1000h | 0/40 |
| High Temp. & Humidity operation 2 | | Ta=60°C, RH=90%, If=10mA | 1000h | 0/40 |

## Criteria for Judging the Damage

| Item | Symbol | Test Condition | Criteria for Judgement | |
|---|---|---|---|---|
| | | | Min. | Max. |
| Forward Voltage | Vf | $I_F$ = 20mA | - | U.S.L* x 1.2 |
| Luminous Intensity | Iv | $I_F$ = 20mA | L.S.L.**x 0.5 | - |

* U.S.L.: Upper standard level

** L.S.L.: Lower standard level