

**Harvatek Surface Mount LED Data Sheet  
HT-193 Series**

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Tentative Product	*****			HT-193 Series
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## 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.

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## Product Specifications

Product	Emission Color	Technology	Test Current $I_F$ (mA)	Luminous Intensity $I_V$ (mcd)	Forward Voltage $V_F$ (V)	Orderable Part Number
HT-193UYG	Ultra Bright Yellow Green	AllnGaP	20	90 typ.	2.0 typ.	HT-193UYG-YYYY
HT-193UY	Ultra Bright Yellow	AllnGaP	20	112.5 typ.	1.9 typ.	HT-193UY-YYYY
HT-193UD	Ultra Bright Amber	AllnGaP	20	112.5 typ.	1.9 typ.	HT-193UD-YYYY
HT-193USD	Ultra Bright Orange	AllnGaP	20	140 typ.	1.9 typ.	HT-193USD-YYYY
HT-193URO	Ultra Bright Red	AllnGaP	20	71.5 typ.	1.9 typ.	HT-193URO-YYYY
HT-193NB	Blue	InGaN	20	90 typ.	3.3 typ.	HT-193NB-YYYY
HT-193NG	Green	InGaN	20	140 typ.	3.3 typ.	HT-193NG-YYYY
HT-193TW	White	InGaN	20	540 typ.	3.3 typ.	HT-193TW-YYYY

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	Specification	Material	Quantity
Resin	Defused	Epoxy resin	
Carrier tape	Per EIA 481-1A specs	Conductive black tape	4000pcs per reel
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  $I_V$ ,  $\lambda_D$  and  $V_f$ . 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.

**Compliance and Certified**

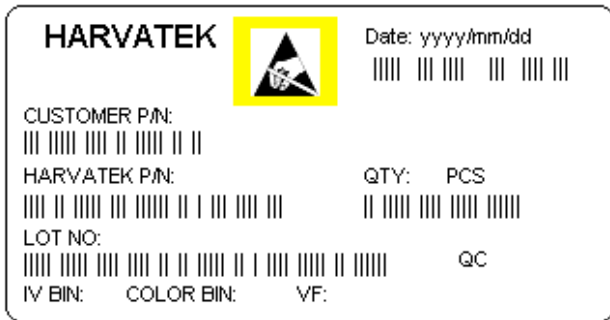
ISO9002, QS9000 and ISO14001 Certified

RoHS Compliant



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### Label Specifications



■ Harvatek P/N:

**H T - 1 9 3    X X X -    Y Y Y Y**

Series Name	Emitting Color	Customer Code
<b>HT-193</b> HT: Harvatek 193: 0603 0.4mm series 1.6 (L) x 0.8 (W) x 0.4 (H) mm Viewing Angle: 140°	<b>XXX</b> HT-193UYG: Ultra Bright Yellow Green HT-193UY: Ultra Bright Yellow HT-193UD: Ultra Bright Amber HT-193USD: Ultra Bright Orange HT-193URO: Ultra Bright Red HT-193NB: Blue HT-193NG: Green HT-193TW: White	<b>YYYY</b> Customer Product Code (TBD)

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**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		

■ **Luminous Intensity (Iv) Bin:**

Bin	Luminous Intensity Range (mcd)		Bin	Luminous Intensity Range (mcd)	
	Minimum	Maximum		Minimum	Maximum
<b>N1</b>	<b>28.5</b>	<b>36.0</b>	<b>N2</b>	<b>36.0</b>	<b>45.0</b>
<b>P1</b>	<b>45.0</b>	<b>57.0</b>	<b>P2</b>	<b>57.0</b>	<b>71.5</b>
<b>Q1</b>	<b>71.5</b>	<b>90.0</b>	<b>Q2</b>	<b>90.0</b>	<b>112.5</b>
<b>R1</b>	<b>112.5</b>	<b>142.0</b>	<b>R2</b>	<b>142.0</b>	<b>180.0</b>
<b>S1</b>	<b>180.0</b>	<b>227.0</b>	<b>S2</b>	<b>227.0</b>	<b>285.0</b>
<b>T1</b>	<b>285.0</b>	<b>360.0</b>	<b>T2</b>	<b>360.0</b>	<b>450.0</b>
<b>U1</b>	<b>450.0</b>	<b>570.0</b>			

@20mA / Ta=25<sup>o</sup> C, Tolerance: ± 10%

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■ Wavelength ( $\lambda_D$ ) Bin:

Bin	Wavelength Range (nm)									
	Ultra Bright Yellow Green (UYG)		Ultra Bright Yellow (UY)		Ultra Bright Amber (UD)		Ultra Bright Orange (USD)		Ultra Bright Red (URO)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
-							615.0	630.0	630.0	650.0
A	561.5	564.5	582.0	584.5	597.0	600.0				
B	564.5	567.5	584.6	587.0	600.0	603.0				
C	567.5	570.5	587.0	589.5	603.0	606.0				
D	570.5	573.5	589.5	592.0	606.0	609.0				
E	573.5	576.5	592.0	594.5	609.0	612.0				
F			594.5	597.0	612.0	615.0				
H										
J										

@20mA / Ta=25<sup>o</sup> C, Tolerance:  $\pm$  0.5nm

Bin	Wavelength Range (nm)			
	Blue (NB)		Green (NG)	
	Min	Max	Min	Max
-				
A				
B	464.0	468.0	520.0	525.0
C	468.0	472.0	525.0	530.0
D	472.0	476.0	530.0	535.0
E				

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F				
H				
J				

@20mA / Ta=25<sup>o</sup> C, Tolerance: ± 0.5nm

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

Color	Bin Code	Spec. Range
<b>Ultra Bright</b> (UYG, UY, UD, USD, URO)	-	<b>2.4 V max</b>
<b>Standard Bright</b> (NB, NG, TW)	-	<b>3.9 V max</b>

@20mA / Ta=25<sup>o</sup>C, Tolerance: ± 0.05 V

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■ Chromaticity (XY) Bin (For TW Only):

	Rank C1			
x	0.2500	0.2700	0.2700	0.2500
y	0.2500	0.2775	0.2325	0.2050

	Rank D1			
x	0.2900	0.3100	0.3100	0.2900
y	0.3050	0.3325	0.2875	0.2600

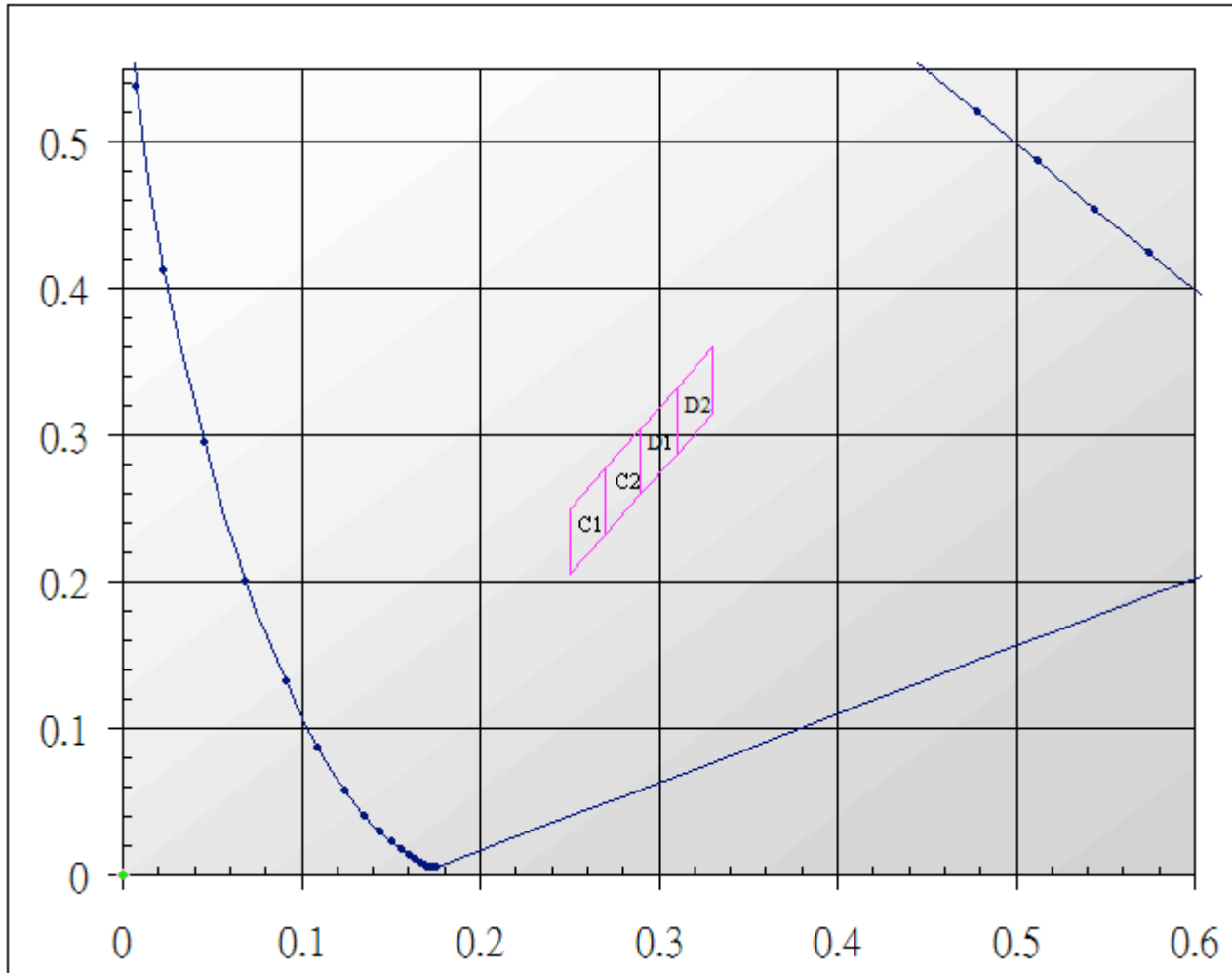
	Rank C2			
x	0.2700	0.2900	0.2900	0.2700
y	0.2775	0.3050	0.2600	0.2325

	Rank D2			
x	0.3100	0.3300	0.3300	0.3100
y	0.3325	0.3600	0.3150	0.2875

@20mA / Ta=25°C, ± 0.05 V

**XY Chromaticity Coordinate:**

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@20mA / Ta=25°C, Tolerance: ±0.01

### Product Characteristics

#### Absolute Maximum Ratings

Product	Emission Color	P <sub>d</sub> (mW)	I <sub>F</sub> (mA)	I <sub>FP</sub> * (mA)	V <sub>R</sub> (V)	T <sub>OP</sub> (°C)	T <sub>ST</sub> (°C)
HT-193UYG	Ultra Bright Yellow Green	72	30	100	5	-30°C~+80°C	-40°C~+85°C

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HT-193UY	Ultra Bright Yellow						
HT-193UD	Ultra Bright Amber						
HT-193USD	Ultra Bright Orange						
HT-193URO	Ultra Bright Red						
HT-193NB	Blue	78	20	80			
HT-193NG	Green						
HT-193TW	White						

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

**Electro-Optical Characteristics**

( $T_a$  25 °C)

Product	Emission Color	$I_F$ (mA)	$V_F$ (V)		$\lambda$ (nm)			$I_V$ (mcd)
			typ.	max	$\lambda_D$	$\lambda_P$	$\Delta\lambda$	typ.
HT-193UYG	Ultra Bright Yellow Green	20	2.0	2.4	573	574	20	90

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HT-193UY	Ultra Bright Yellow	20	1.9	2.4	589	593	15	112.5
HT-193UD	Ultra Bright Amber	20	1.9	2.4	605	609	17	112.5
HT-193USD	Ultra Bright Orange	20	1.9	2.4	622	636	17	140
HT-193URO	Ultra Bright Red	20	1.9	2.4	632	645	22	71.5
HT-193NB	Blue	20	3.3	3.9	470	468	40	90
HT-193NG	Green	20	3.3	3.9	527	520	40	140
HT-193TW	White	20	3.3	3.9	X=0.29 Y=0.31	-	-	540

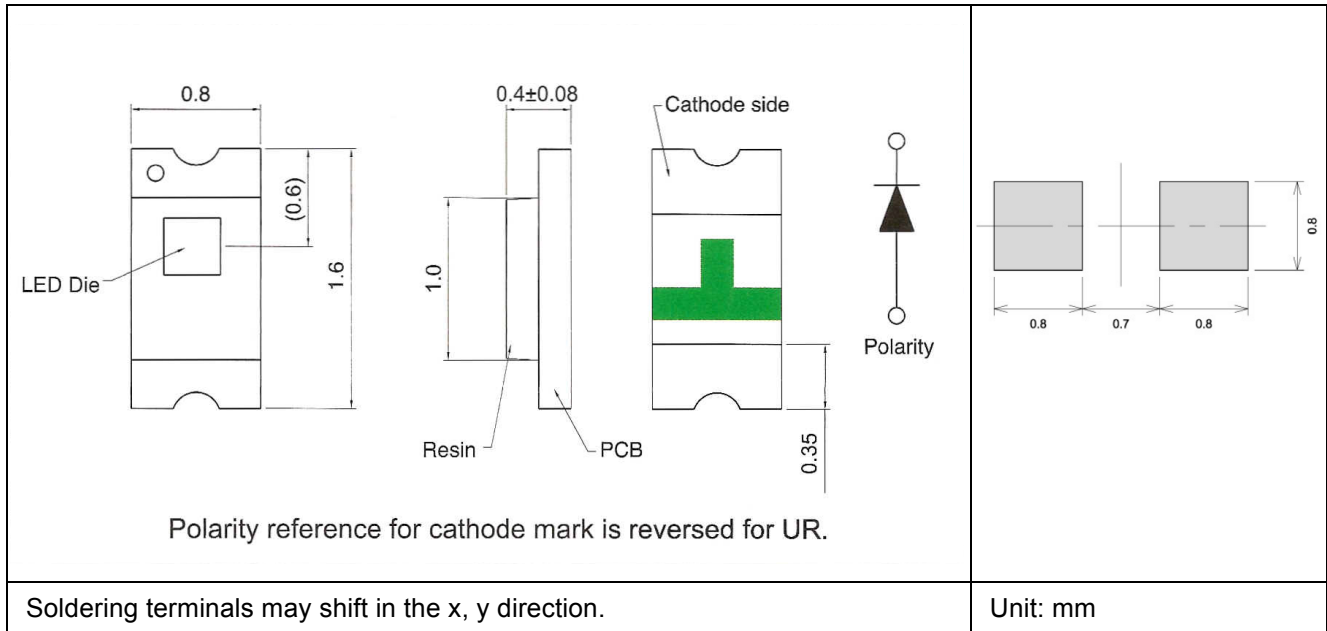
\* Per NIST standards

<b>Package Outline Dimension Recommended Soldering Pattern for Reflow Soldering</b>
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Unit: mm Tolerance: +/-0.1

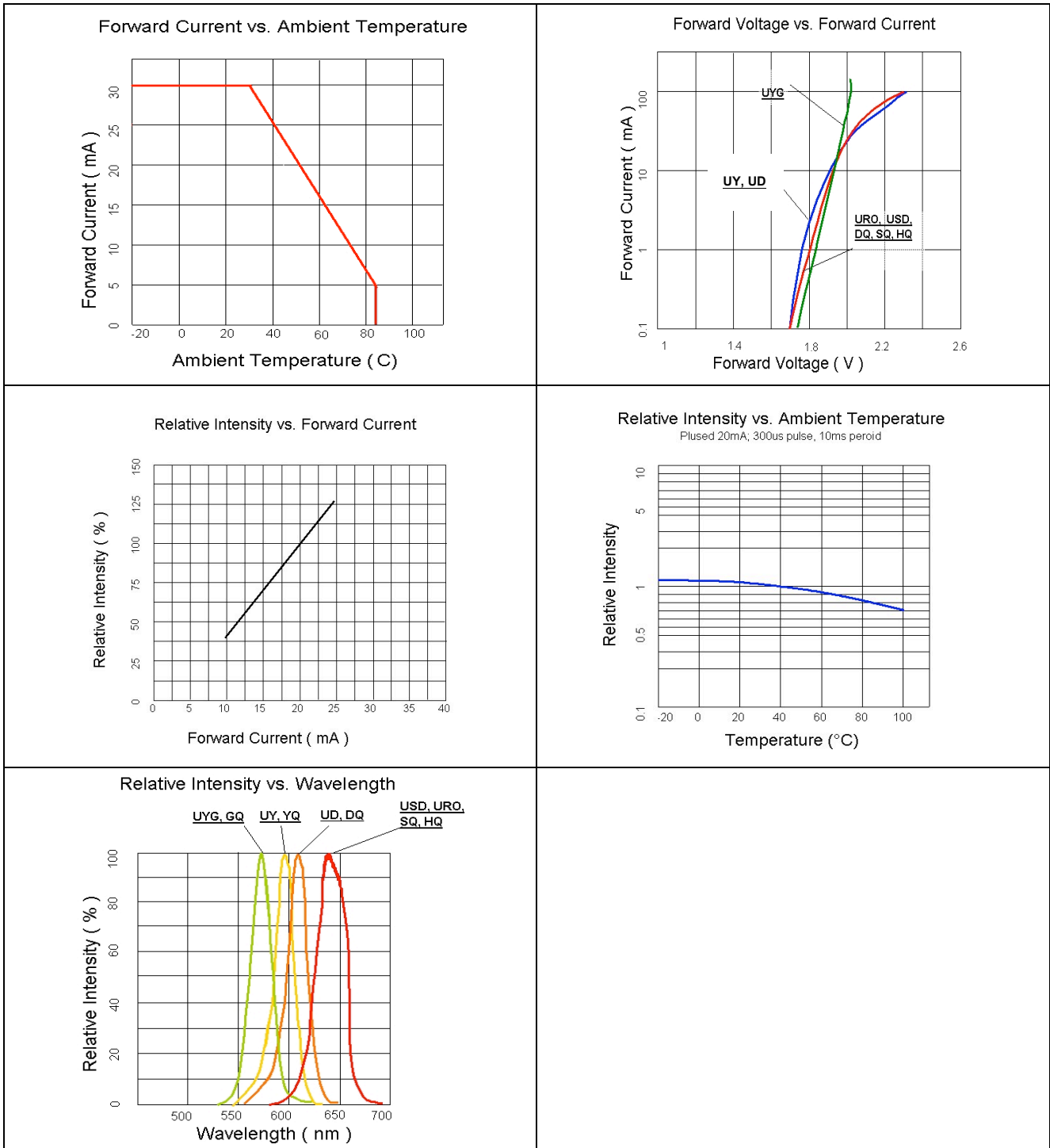
Outline Dimension	Solder Pattern
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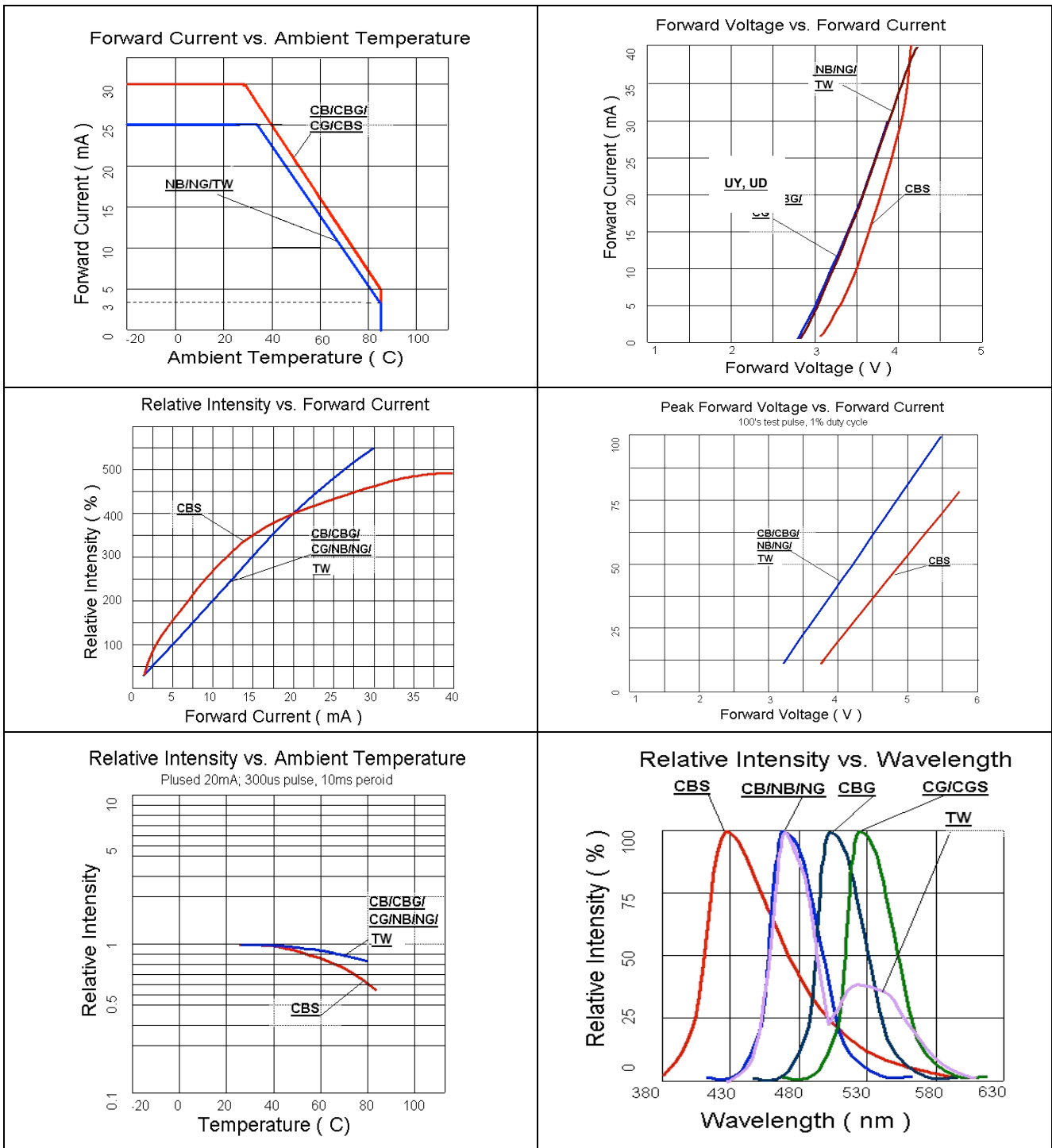
**Characteristic Curves for UYG, UY, UD, USD, and URO**

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**Characteristic Curves for NB, NG and TW**

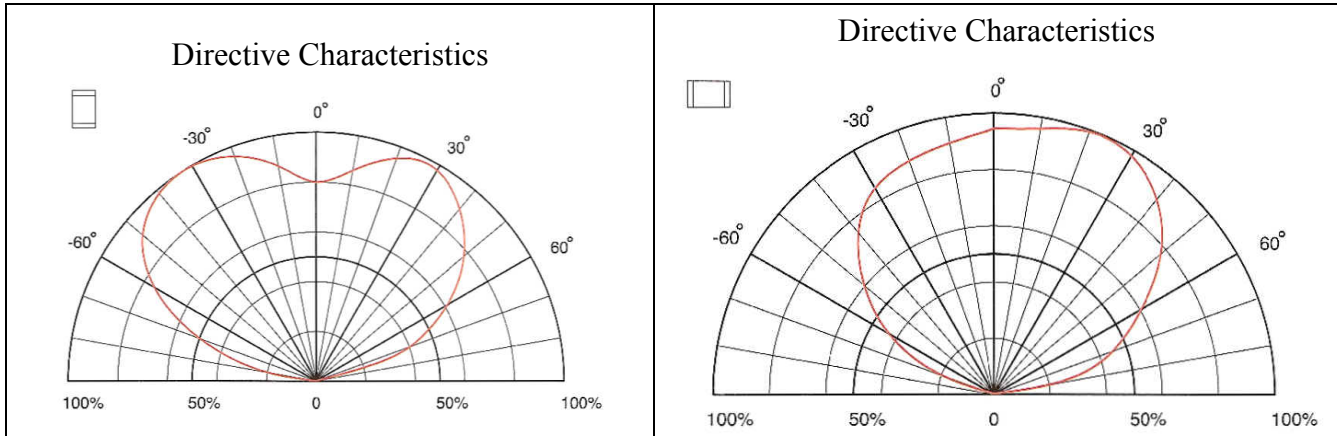
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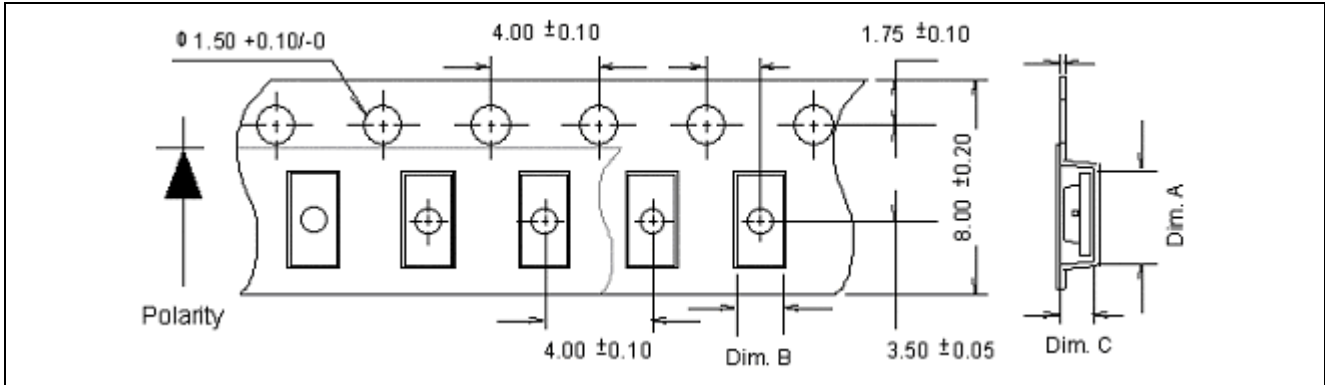
**Characteristic Curves for All Colors (Radiation Pattern)**



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Packaging

Tape Dimension

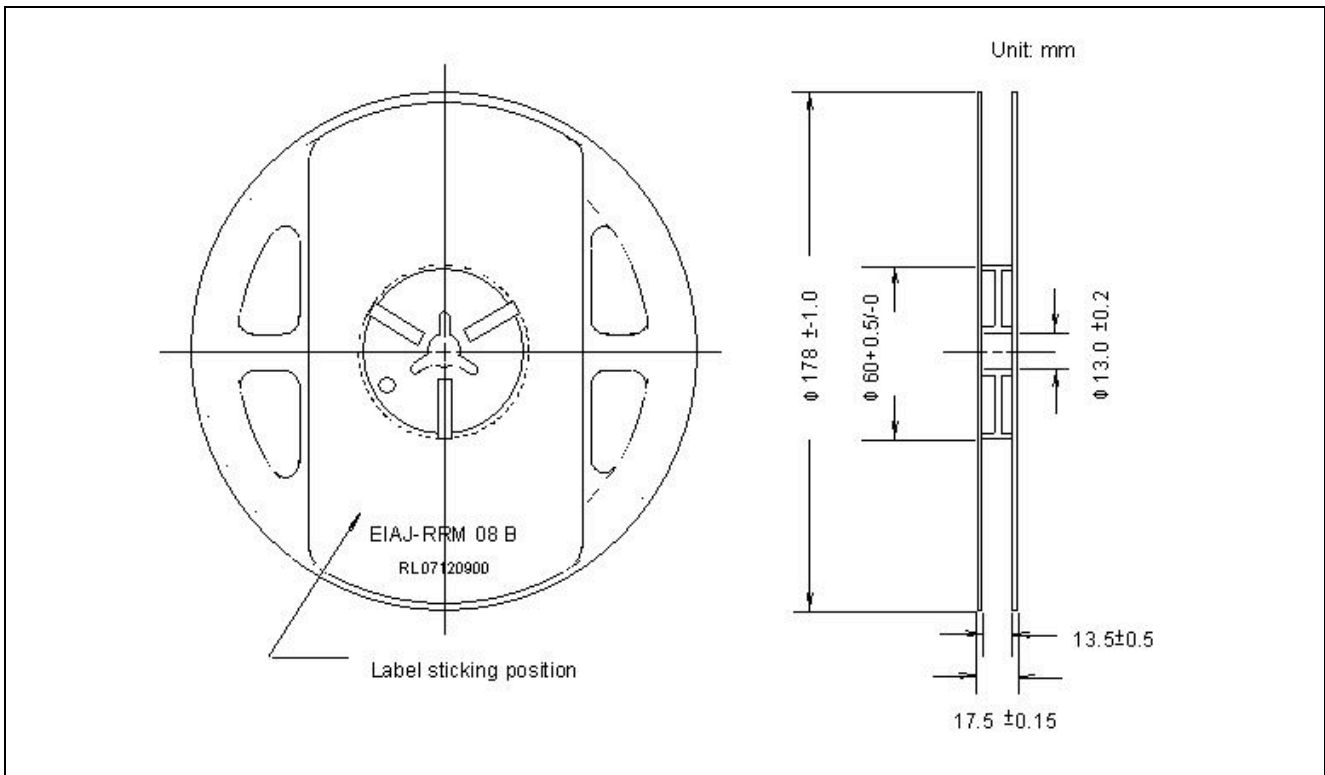


Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-193	1.80± 0.10	0.95± 0.10	0.60± 0.10	4K

Unit: mm

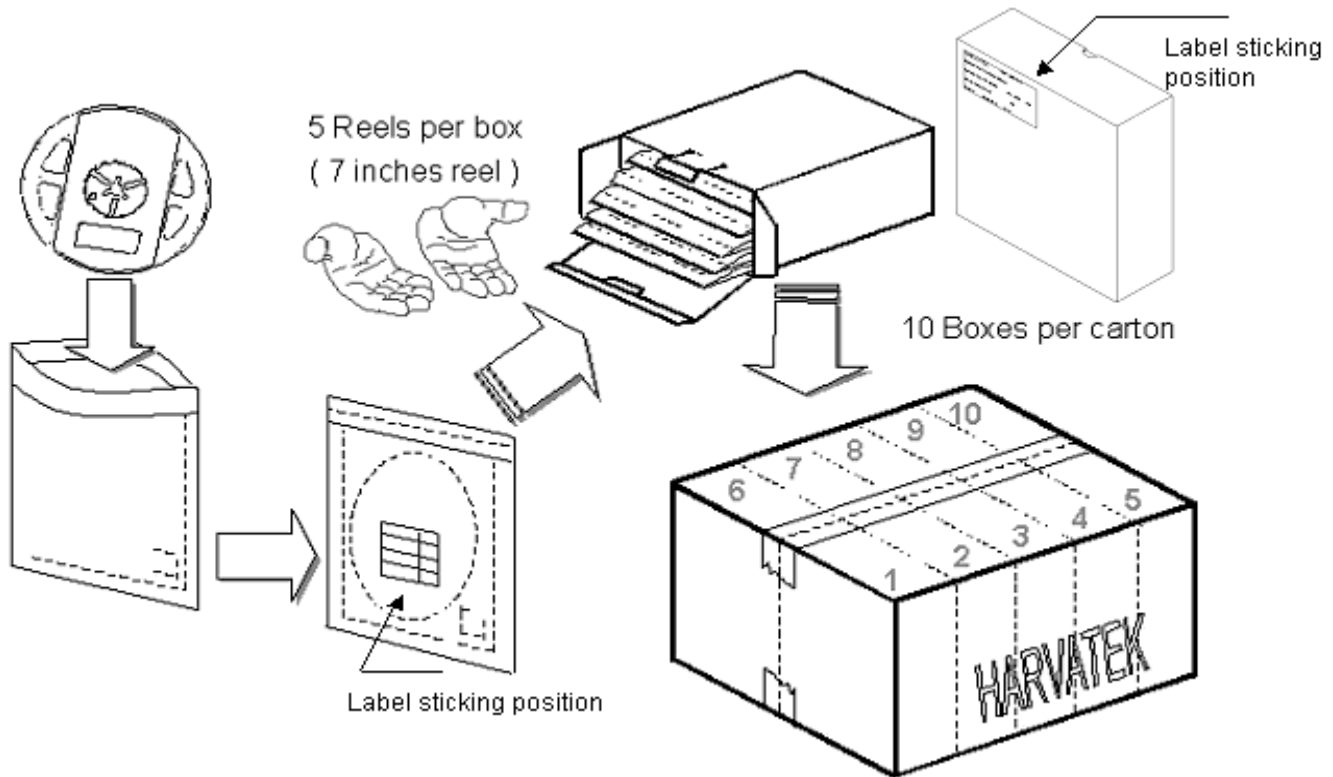
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**Reel Dimension**



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### Packing



5 boxes per carton is available depending on shipment quantity.

	Specification	Material	Quantity
Carrier tape	Per EIA 481-1A specs	Conductive black tape	4000pcs per reel
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	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  $I_V$ ,  $\lambda_D$  and  $V_f$ . Each reel has a label identifying its specification; the immediate box consists of a product label as well.

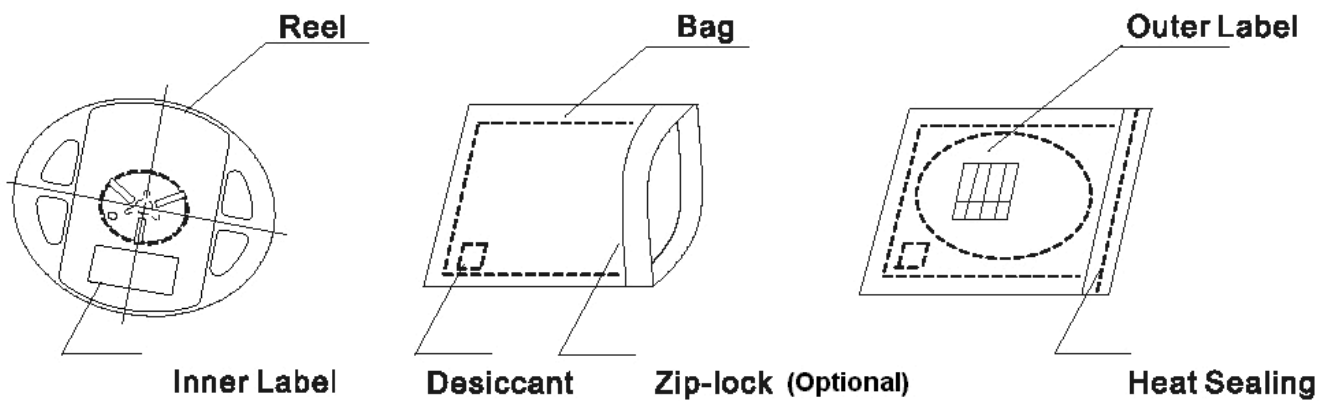
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## Dry Pack

All SMD optical devices are **MOISTURE SENSITIVE**. Avoid exposure to moisture at all times during transportation or storage. Every reel is packaged in a moisture protected anti-static bag. Each bag is properly sealed prior to shipment.

Upon request, a humidity indicator will be included in the moisture protected anti-static bag prior to shipment.

The packaging sequence is as follows:

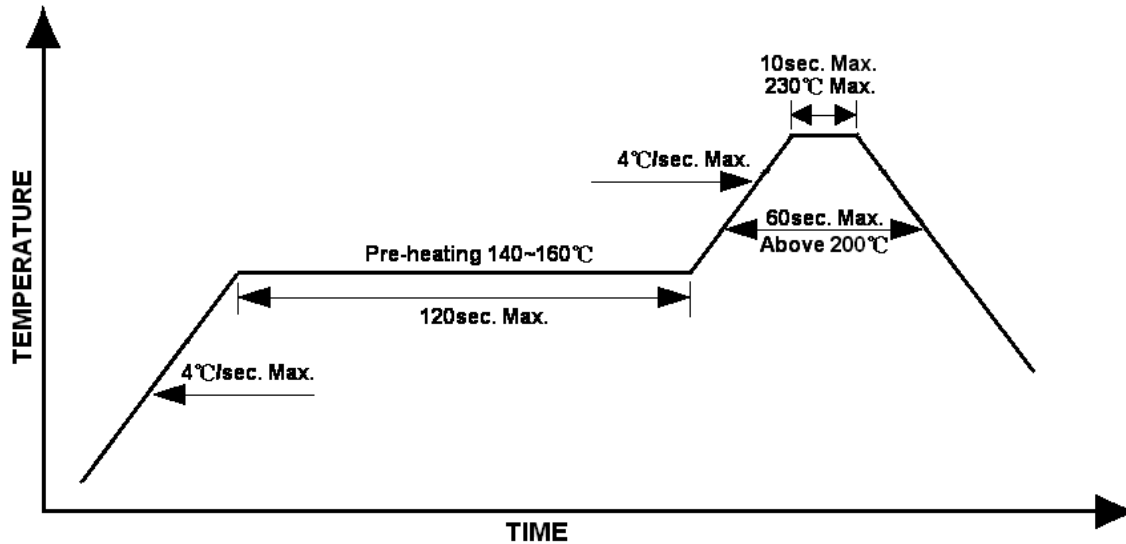


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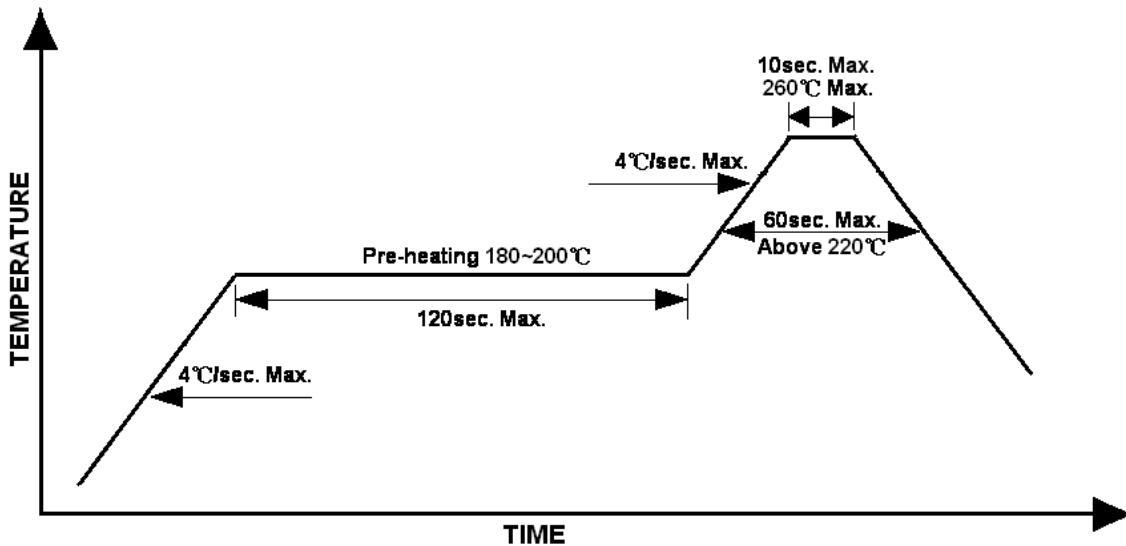
### Reflow Soldering

- Recommended tin glue specifications: melting temperature in the range of 178~192 °C
- The recommended reflow soldering profile is as follows (temperatures indicated are as measured on the surface of the LED resin):

Lead Solder Profile



Lead-free Solder Profile



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### Precautions

1. Avoid exposure to moisture at all times during transportation or storage.
2. Anti-Static precaution must be taken when handling GaN, InGaN, and AlInGaP products.
3. It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage.
4. Avoid operation beyond the limits as specified by the absolute maximum ratings.
5. Avoid direct contact with the surface through which the LED emits light.
6. If possible, assemble the unit in a clean room or dust-free environment.

### Reworking

- Rework should be completed within 5 seconds under 260 °C.
- The iron tip must not come in contact with the copper foil.
- Twin-head type is preferred.

### 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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**Reliability**

Item	Frequency/ lots/ samples/ failures	Standards Reference	Conditions
Precondition	For all reliability monitoring tests according to JEDEC Level 2	J-STD-020	1.) Baking at 85°C for 24hrs 2.) Moisture storage at 85°C/ 60% R.H. for 168hrs
Solderability	1Q/ 1/ 22/ 0	JESD22-B102-B And CNS-5068	Accelerated aging 155°C/ 24hrs Tinning speed: 2.5+0.5cm/s Tinning: A: 215°C/ 3+1s or B: 260°C/ 10+1s
Resistance to soldering heat		CNS-5067	Dipping soldering terminal only Soldering bath temperature A: 260+/-5°C; 10+/-1s B: 350+/-10°C; 3+/-0.5s
Operating life test	1Q/ 1/ 40/ 0	CNS-11829	1.) Precondition: 85°C baking for 24hrs 85°C/ 60%R.H. for 168hrs 2.) Tamb25°C; IF=20mA; duration 1000hrs
High humidity, high temperature bias	1Q/ 1/ 45/ 0	JESD-A101-B	Tamb: 85°C Humidity: 85% R.H., IF=5mA Duration: 1000hrs
High temperature bias	1Q/ 1/ 20	HT specs.	Tamb: 55°C IF=20mA Duration: 1000hrs
Pulse life test	1Q/ 1/ 40/ 0		Tamb25°C, If=20mA,, Ip=100mA, Duty cycle=0.125 (tp=125 μs, T=1sec) Duration 500hrs)
Temperature cycle	1Q/ 1/ 76/ 0	JESD-A104-A IEC 68-2-14, Nb	A cycle: -40 degree C 15min; +85 degree C 15min Thermal steady within 5 min.. 300 cycles 2 chamber/ Air-to-air type
High humidity storage test	1Q/ 1/ 40/ 0	CNS-6117	60+3°C 90+5/-10% R.H. for 500hrs
High temperature storage test	1Q/ 1/ 40/ 0	CNS-554	100+10°C for 500hrs
Low temperature storage test	1Q/ 1/ 40/ 0	CNS-6118	-40+5°C for 500hrs

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Changes since last revision	Page	Version No.	Revision Date
Initial Release		1.0	06-19-2013

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Authorized Distributor

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Inolux:

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