

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

Official Product	Product: HT-193 Series			Data Sheet No.
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	AlInGaP	20	50 typ.	2.0 typ.	HT-193UYG-YYYY
HT-193UY	Ultra Bright Yellow	AlInGaP	20	45 typ.	1.9 typ.	HT-193UY-YYYY
HT-193UD	Ultra Bright Amber	AlInGaP	20	45 typ.	1.9 typ.	HT-193UD-YYYY
HT-193USD	Ultra Bright Orange	AlInGaP	20	45 typ.	1.9 typ.	HT-193USD-YYYY
HT-193URO	Ultra Bright Red	AlInGaP	20	45 typ.	1.9 typ.	HT-193URO-YYYY
HT-193NB	Blue	InGaN	20	45 typ.	3.3 typ.	HT-193NB-YYYY
HT-193NG	Green	InGaN	20	100 typ.	3.3 typ.	HT-193NG-YYYY
HT-193TW	White	InGaN	20	200 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 , λ_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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HARVATEK			Date: yyyy/mm/dd
CUSTOMER P/N:			
HARVATEK P/N:		QTY:	PCS
LOT NO:			QC
IV BIN:	COLOR BIN:	VF:	

H T - 1 9 3 XXX - YYYY

The diagram illustrates the mapping of a 10-digit number to a 12-character string. The string is divided into three segments: a 6-character segment (H T - 1 9 3), a 3-character segment (XXX -), and a 3-character segment (YYYY). The 6-character segment is associated with a blue bar, the 3-character segment with a green bar, and the final 3-character segment with a red bar. Arrows indicate the mapping from the bars to the corresponding parts of the string.

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

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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	Z: 2000 1: 2001 2: 2002 3: 2003	1: Jan. 2: Feb. 9: Sep. A: Oct. B: Nov. C: Dec.	1~31/ (30)	01~99, A,B,C...	C: Clear D: Diffused	T: Tape & Reel

■ Luminous Intensity (Iv) Bin:

Bin	Luminous Intensity Range (mcd)		Bin	Luminous Intensity Range (mcd)	
	Minimum	Maximum		Minimum	Maximum
H1	2.8	3.6	H2	3.6	4.5
J1	4.5	5.7	J2	5.7	7.2
K1	7.2	9.0	K2	9.0	11.2
L1	11.2	14.2	L2	14.2	18.0
M1	18.0	22.5	M2	22.5	28.5
N1	28.5	36.0	N2	36.0	45.0
P1	45.0	57.0	P2	57.0	71.5
Q1	71.5	90.0	Q2	90.0	112.5
R1	112.5	142.0	R2	142.0	180.0
S1	180.0	227.0	S2	227.0	285.0
T1	285.0	360.0	T2	360.0	450.0
U1	450.0	570.0			

@20mA / Ta=25° C, Tolerance: ± 10%

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■ Wavelength (λ_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° C, Tolerance: $\pm 0.5\text{nm}$

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				
F				
H				
J				

@20mA / Ta=25° C, Tolerance: $\pm 0.5\text{nm}$

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■ Forward Voltage (V_F) Bin:

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

@20mA / Ta=25°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

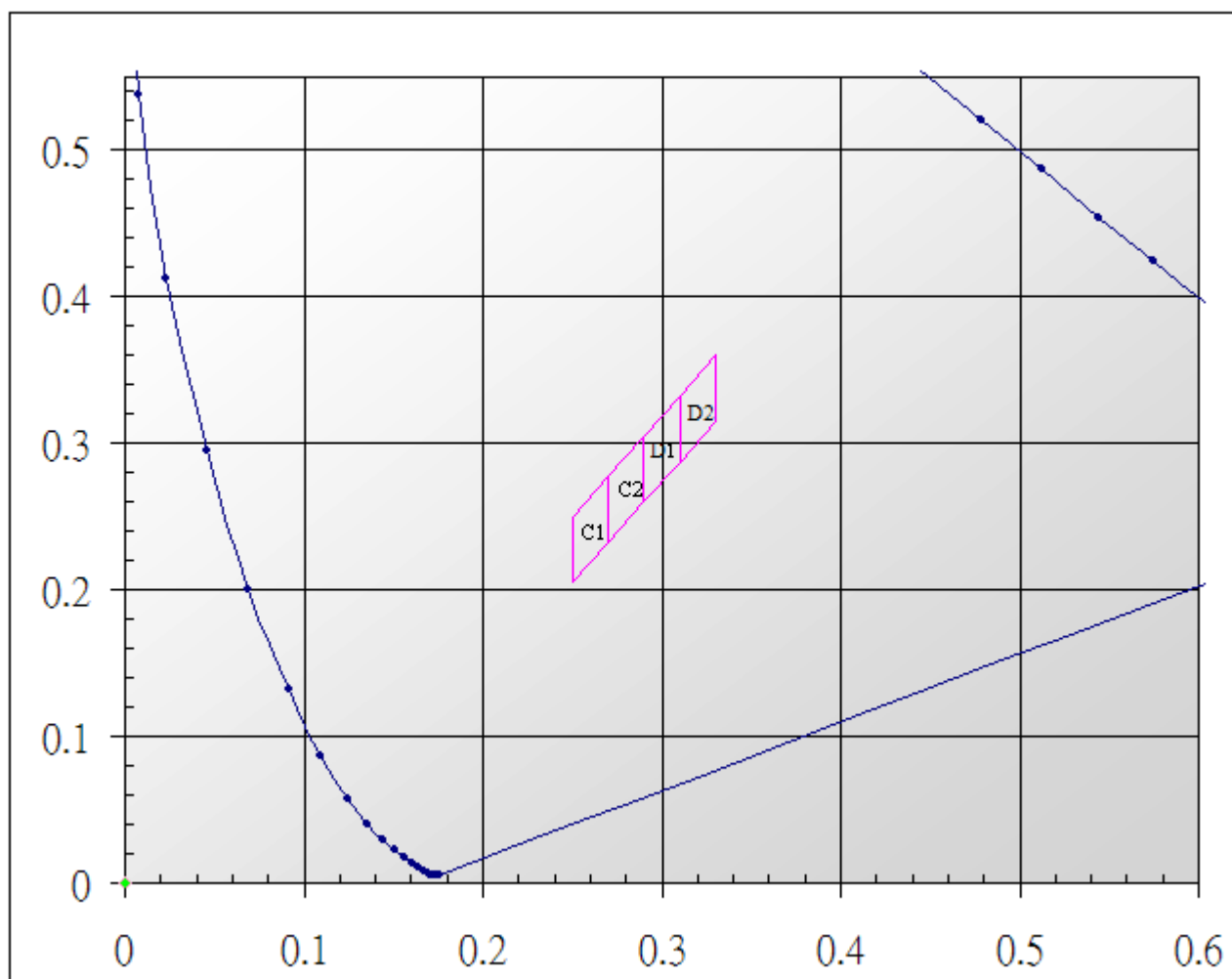
	Rank D1			
x	0.2900	0.3100	0.3100	0.2900
y	0.3050	0.3325	0.2875	0.2600

	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:



@20mA / Ta=25°C, Tolerance: ±0.01

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Product Characteristics

Absolute Maximum Ratings

Product	Emission Color	P _d (mW)	I _F (mA)	I _{FP} * (mA)	V _R (V)	T _{OP} (°C)	T _{ST} (°C)
HT-193UYG	Ultra Bright Yellow Green	72	30	100	5	-30°C~+80°C	-40°C~+85°C
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

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Electro-Optical Characteristics

(T_a 25 °C)

Product	Emission Color	I _F (mA)	V _F (V)		λ(nm)			I _V (mcd)	
			typ.	max	λ _D	λ _P	Δλ	min	typ.
HT-193UYG	Ultra Bright Yellow Green	20	2.0	2.4	573	574	20	30	50
HT-193UY	Ultra Bright Yellow	20	1.9	2.4	589	593	15	30	45
HT-193UD	Ultra Bright Amber	20	1.9	2.4	605	609	17	30	45
HT-193USD	Ultra Bright Orange	20	1.9	2.4	622	636	17	30	45
HT-193URO	Ultra Bright Red	20	1.9	2.4	632	645	22	30	45
HT-193NB	Blue	20	3.3	3.9	470	468	40	28	40
HT-193NG	Green	20	3.3	3.9	527	520	40	70	100
HT-193TW	White	20	3.3	3.9	X=0.29 Y=0.31	-	-	70	200

* Per NIST standards

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Package Outline Dimension

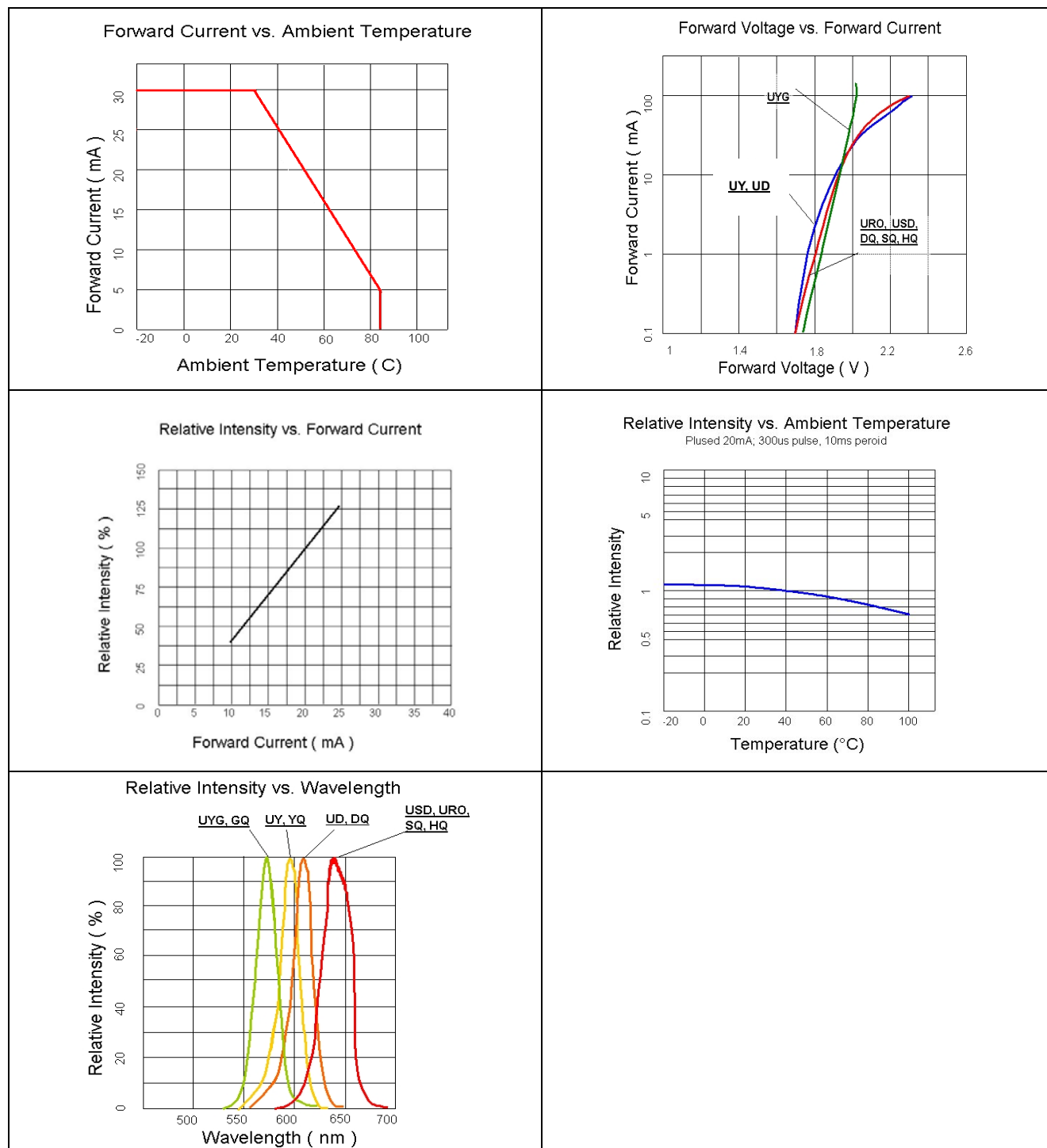
Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

Outline Dimension	Solder Pattern
Polarity reference for cathode mark is reversed for UR.	
Soldering terminals may shift in the x, y direction.	Unit: mm

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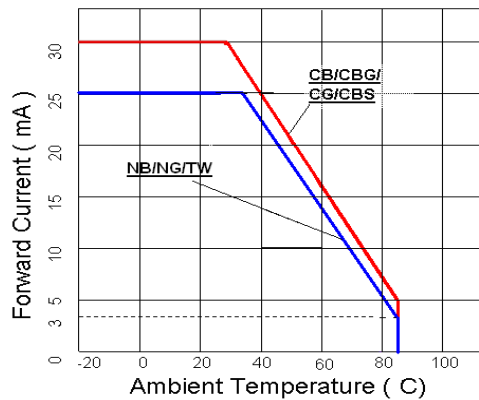
Characteristic Curves for UYG, UY, UD, USD, and URO



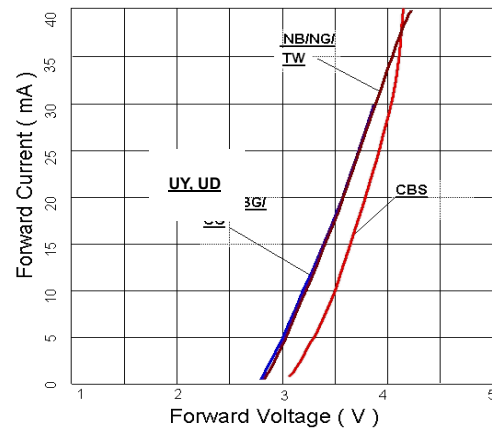
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Characteristic Curves for NB, NG and TW

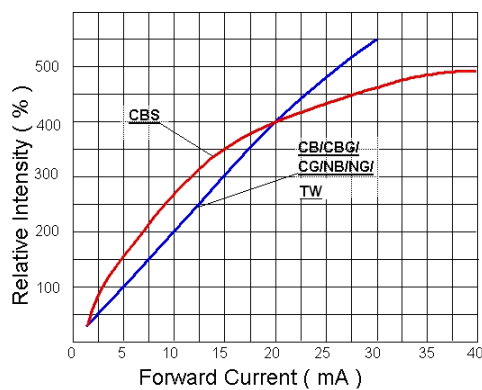
Forward Current vs. Ambient Temperature



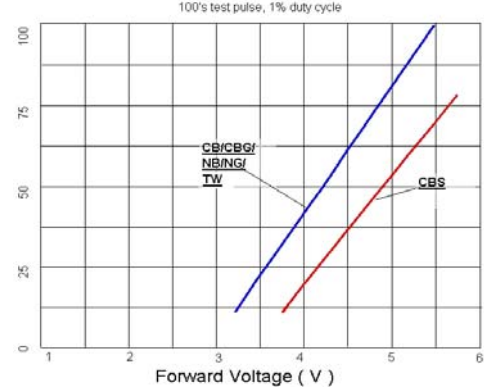
Forward Voltage vs. Forward Current



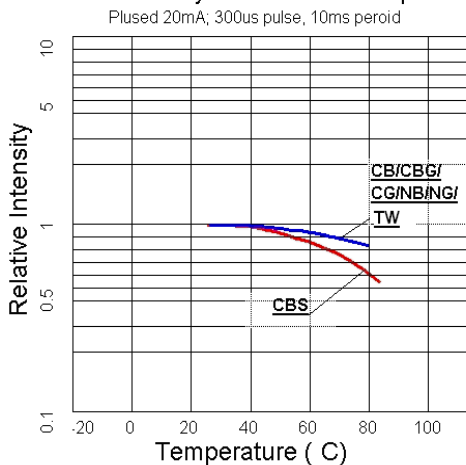
Relative Intensity vs. Forward Current



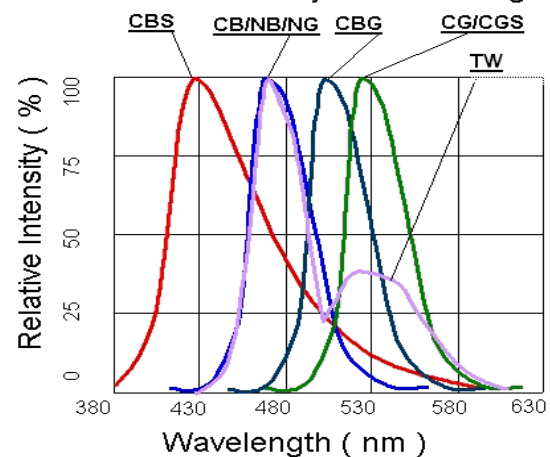
Peak Forward Voltage vs. Forward Current



Relative Intensity vs. Ambient Temperature

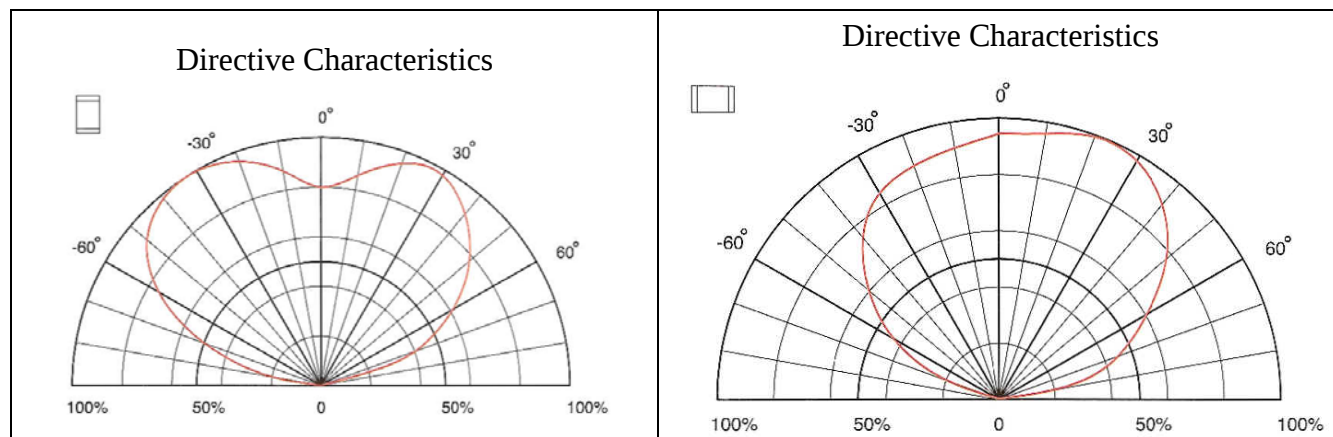


Relative Intensity vs. Wavelength



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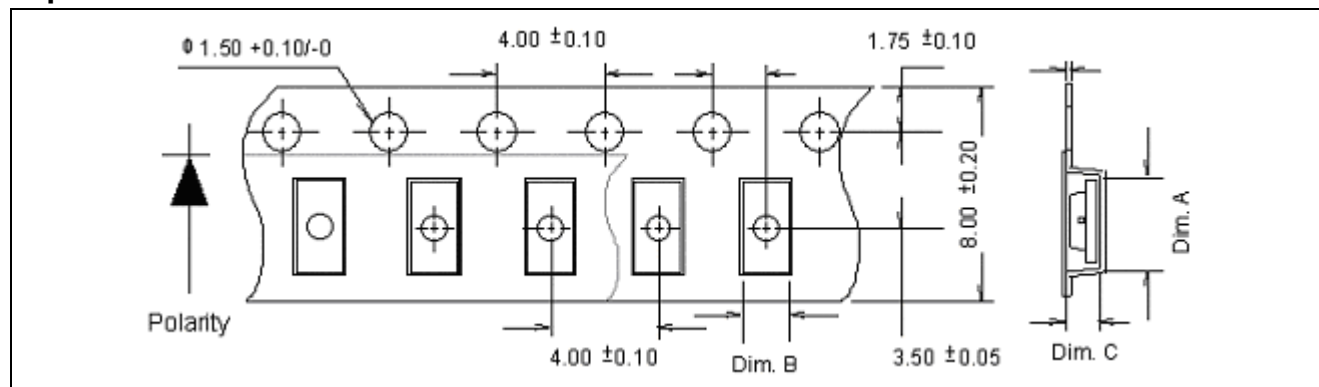
Characteristic Curves for All Colors (Radiation Pattern)



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Packaging

Tape Dimension

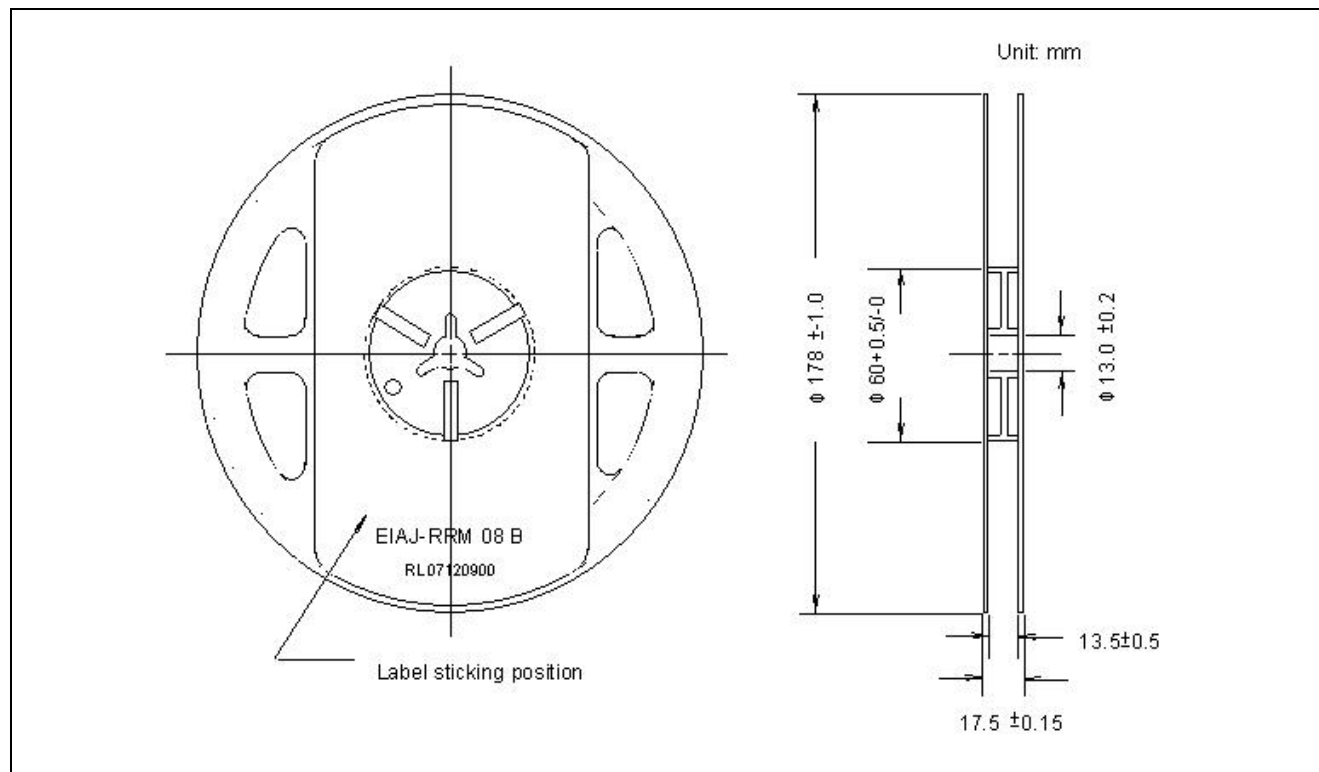


Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-193	1.80 ± 0.10	0.95 ± 0.10	0.60 ± 0.10	4K

Unit: mm

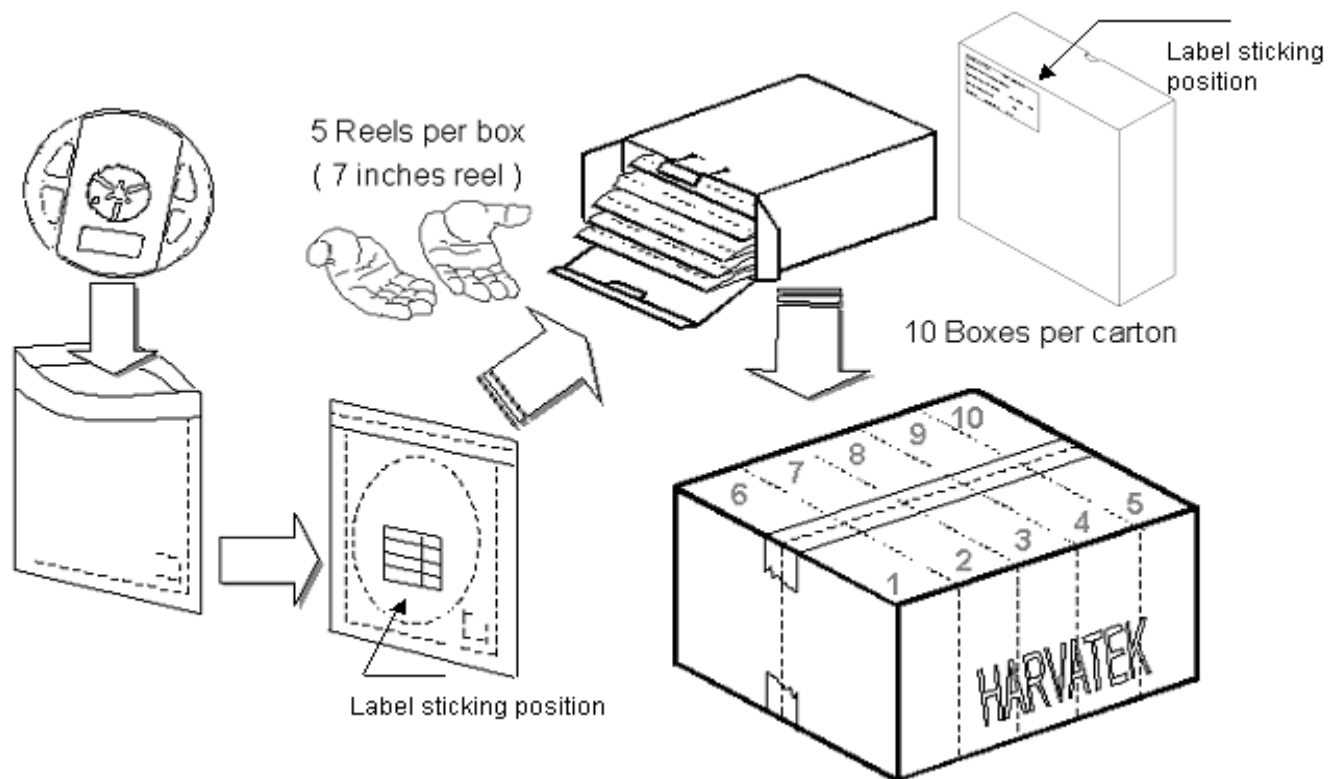
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Reel Dimension



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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 Iv, λ_D and Vf. Each reel has a label identifying its specification; the immediate box consists of a product label as well.			

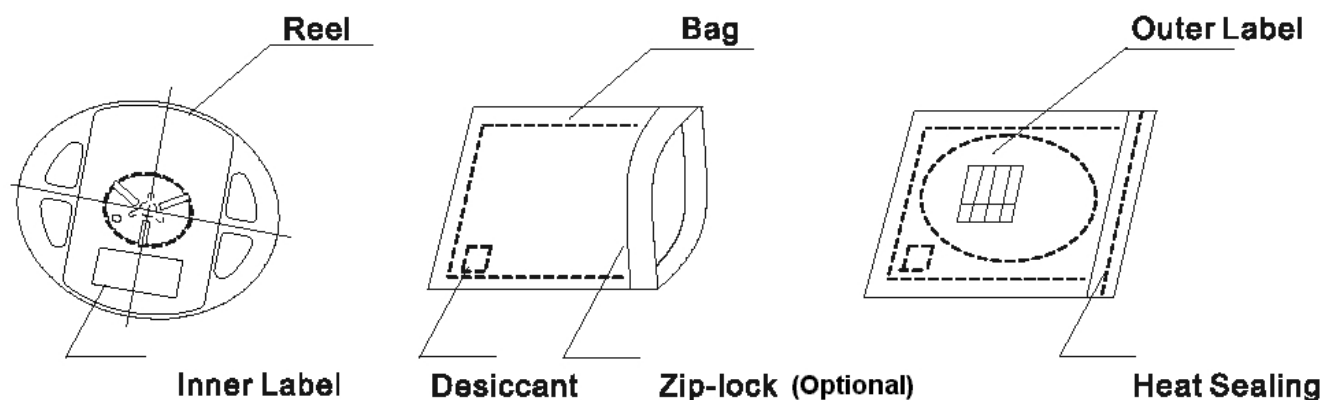
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Dry Pack

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:

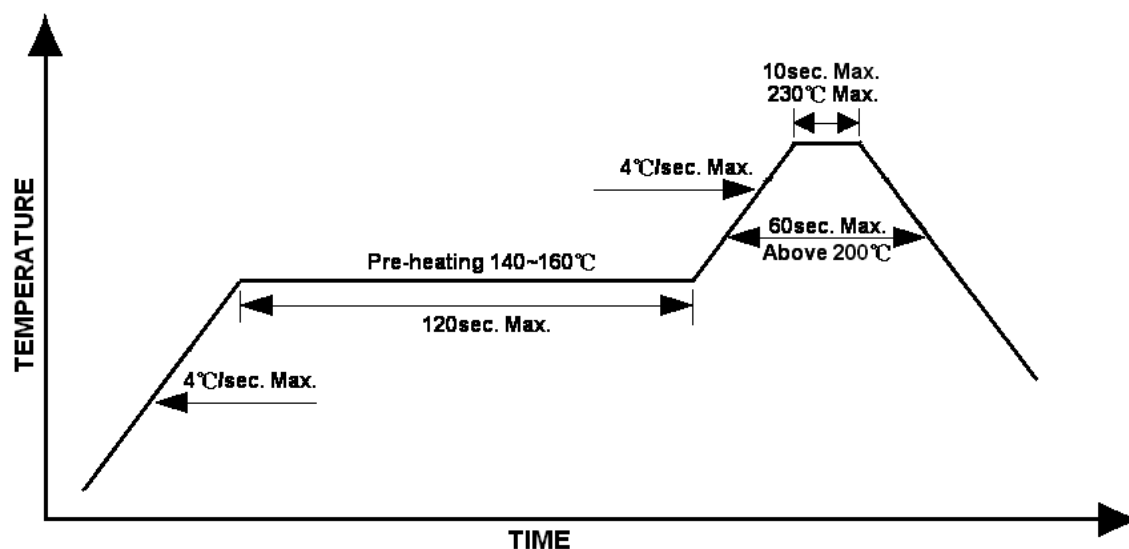


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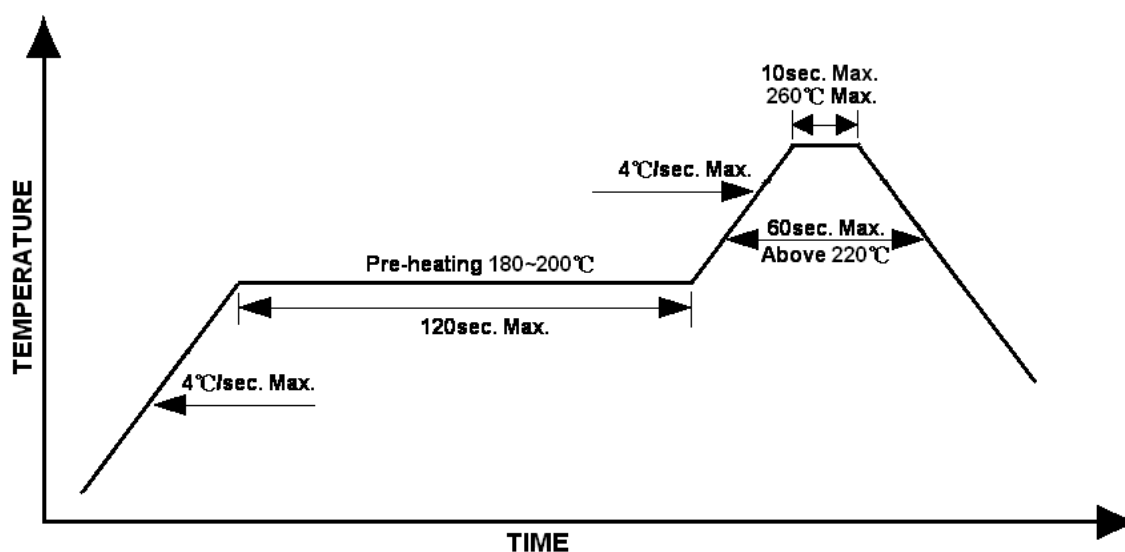
Reflow Soldering

- 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 beyond the specified limit.
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 μ s, 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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Revision History

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New format		1.0	07-17-2008

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