

**Harvatek Surface Mount LED Data Sheet
HT-155 Series**

Official Product	Product: HT-155 Series			Data Sheet No.
Tentative Product	*****			HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Aug. 29, 2005	Version of 1.0	Page 1/24

DISCLAIMER	3
PRODUCT SPECIFICATIONS	4
ATTENTION: ELECTROSTATIC DISCHARGE (ESD) PROTECTION	5
LABEL SPECIFICATIONS	6
PRODUCT CHARACTERISTICS	10
ABSOLUTE MAXIMUM RATINGS	10
ELECTRO-OPTICAL CHARACTERISTICS	11
PACKAGE OUTLINE DIMENSION	12
RECOMMENDED SOLDERING PATTERN FOR REFLOW SOLDERING	12
CHARACTERISTIC CURVES FOR YG, Y, D AND SD	13
CHARACTERISTIC CURVES FOR UYG, UY, UD AND USD	14
CHARACTERISTIC CURVES FOR NB	15
CHARACTERISTIC CURVES FOR ALL COLORS (RADIATION PATTERN)	16
PACKAGING	17
TAPE DIMENSION	17
REEL DIMENSION	18
PACKING	19
DRY PACK	20
REFLOW SOLDERING	21
PRECAUTIONS	22
REWORKING	22
CLEANING	22
RELIABILITY	23
REVISION HISTORY	24

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 2/24

DISCLAIMER

HARVATEK reserves the right to make changes without further notice to any products herein to improve reliability, function or design. HARVATEK does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

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.

Official Product	Product: HT-155 Series			Data Sheet No.
Tentative Product	*****			HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 3/24	

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-155SD/YG	Red / Green	GaAsP / GaP	20	14 / 20 typ	2.1 / 2.2 typ	HT-155SD/YG-ZZZZ
HT-155Y/YG	Yellow / Green	GaAsP / GaP	20	9 / 20 typ	2.1 / 2.2 typ	HT-155Y/YG-ZZZZ
HT-155D/YG	Orange / Green	GaAsP / GaP	20	12 / 20 typ	2.1 / 2.2 typ	HT-155D/YG-ZZZZ
HT-155USD/UYG	Red / Green	AllnGaP / AllnGaP	20	120 / 90 typ	1.9 / 2.0 typ	HT-155USD/UYG-ZZZZ
HT-155UY/UYG	Yellow / Green	AllnGaP / AllnGaP	20	90 / 90 typ	1.9 / 2.0 typ	HT-155UY/UYG-ZZZZ
HT-155UD/UYG	Orange / Green	AllnGaP / AllnGaP	20	90 / 90 typ	1.9 / 2.0 typ	HT-155UD/UYG-ZZZZ
HT-155USD/NB	Red / Blue	AllnGaP / InGaN	20	120 / 56 typ	1.9 / 3.3 typ	HT-155USD/NB-ZZZZ
HT-155UY/NB	Yellow / Blue	AllnGaP / InGaN	20	90 / 56 typ	1.9 / 3.3 typ	HT-155UY/NB-ZZZZ
HT-155UD/NB	Orange / Blue	AllnGaP / InGaN	20	90 / 56 typ	1.9 / 3.3 typ	HT-155UD/NB-ZZZZ

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Aug. 29, 2005	Version of 1.0
			Page 4/24

	Specification	Material	Quantity
Resin	Diffused	Epoxy resin	
Carrier tape	Per EIA 481-1A specs	Conductive black tape	3000pcs 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

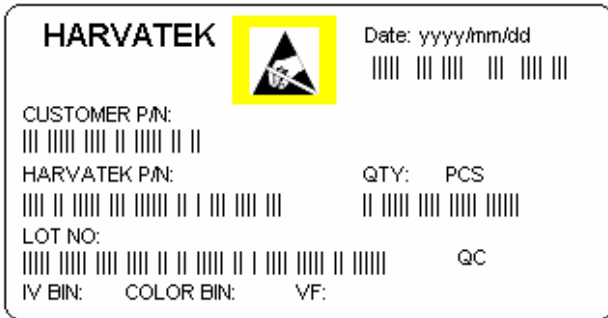


The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlInGaP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD 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.

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 5/24

Label Specifications



Harvatek P/N:

H T - 1 5 5 XXX / YYY- ZZZZ

Series Name	Emitting Color	Customer Code
HT-155 HT: Harvatek 155: 1210 1.1mm series 3.2 (L) x 2.7 (W) x 1.1 (H) mm	XXX / YYY YG: Yellow Green Y: Yellow D: Orange SD: Red UYG: Ultra Bright Yellow Green UY: Ultra Bright Yellow UD: Ultra Bright Orange USD: Ultra Bright Red NB: Blue	ZZZZ Customer Product Code (TBD)

Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 6/24

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	U2	570.0	715.0

@20mA / Ta=25° C, Tolerance: ± 10%

Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 7/24

Wavelength (λ_D) Bin:

Bin	Wavelength Range (nm)							
	Red (SD)		Orange (D)		Yellow (Y)		Yellow Green (YG)	
	Min	Max	Min	Max	Min	Max	Min	Max
-	615.0	635.0						
A			597.0	600.0	582.0	584.5	561.5	564.5
B			600.0	603.0	584.6	587.0	564.5	567.5
C			603.0	606.0	587.0	589.5	567.5	570.5
D			606.0	609.0	589.5	592.0	570.5	573.5
E			609.0	612.0	592.0	594.5	573.5	576.5
F			612.0	615.0	594.5	597.0		
H								
J								

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

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

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

Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 8/24

Bin	Wavelength Range (nm)	
	Blue (NB)	
	Min	Max
-		
A	460.0	464.0
B	464.0	468.0
C	468.0	472.0
D	472.0	476.0
E	476.0	480.0
F	480.0	485.0
H		
J		

@20mA / Ta=25°C, Tolerance: ± 0.5nm

Forward Voltage (V_F) Bin:

Color	Bin Code	Spec. Range
Blue (NB)	G8	2.7-2.9 V
	H7	2.9-3.1 V
	H8	3.1-3.3 V
	J7	3.3-3.5 V
	J8	3.5-3.7 V
	K7	3.7-3.9 V
Ultra Bright (UYG, UY, UD, USD)	-	2.4 V max
Standard Bright (YG, Y, D, SD)	-	2.6 V max

@20mA / Ta=25°C, Tolerance: ± 0.05 V

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 9/24

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-155SD/YG	Red / Green	65 / 65	25 / 25	100 / 100	5	-30°C~+85°C	-40°C~+90°C
HT-155Y/YG	Yellow / Green						
HT-155D/YG	Orange / Green						
HT-155USD/UYG	Red / Green	72 / 72	30 / 30	100 / 100			
HT-155UY/UYG	Yellow / Green						
HT-155UD/UYG	Orange / Green						
HT-155USD/NB	Red / Blue	72 / 78	30 / 25	100 / 80			
HT-155UY/NB	Yellow / Blue						
HT-155UD/NB	Orange / Blue						

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

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Aug. 29, 2005	Version of 1.0
			Page 10/24

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-155SD/YG	Red / Green	20	2.1 / 2.2	2.6 / 2.6	629 / 573	642 / 568	35 / 30	5.6 / 9	14 / 20
HT-155Y/YG	Yellow / Green	20	2.1 / 2.2	2.6 / 2.6	590 / 573	589 / 568	35 / 30	5.6 / 9	9 / 20
HT-155D/YG	Orange / Green	20	2.1 / 2.2	2.6 / 2.6	608 / 573	610 / 568	35 / 30	5.6 / 9	12 / 20
HT-155USD/UYG	Red / Green	20	1.9 / 2.0	2.4 / 2.4	622 / 573	636 / 574	17 / 20	50 / 36	120 / 90
HT-155UY/UYG	Yellow / Green	20	1.9 / 2.0	2.4 / 2.4	591 / 573	593 / 574	15 / 20	40 / 36	90 / 90
HT-155UD/UYG	Orange / Green	20	1.9 / 2.0	2.4 / 2.4	605 / 573	609 / 574	17 / 20	40 / 36	90 / 90
HT-155USD/NB	Red / Blue	20	1.9 / 3.3	2.4 / 3.9	622 / 470	636 / 468	17 / 40	50 / 36	120 / 56
HT-155UY/NB	Yellow / Blue	20	1.9 / 3.3	2.4 / 3.9	591 / 470	593 / 468	15 / 40	40 / 36	90 / 56
HT-155UD/NB	Orange / Blue	20	1.9 / 3.3	2.4 / 3.9	605 / 470	609 / 468	17 / 40	40 / 36	90 / 56

* Per NIST standards

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Aug. 29, 2005	Version of 1.0
			Page 11/24

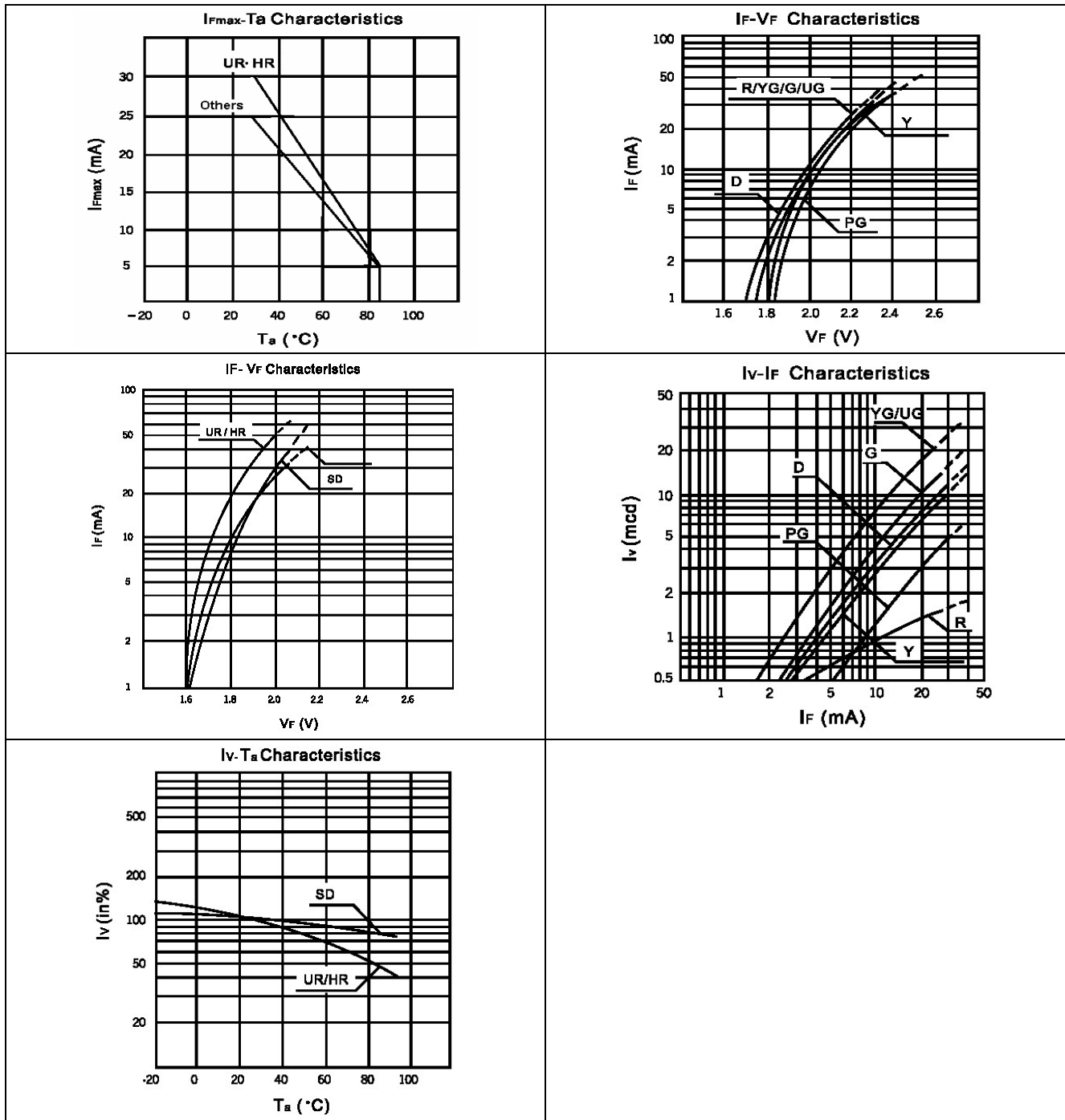
Package Outline Dimension
Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

Outline Dimension	Solder Pattern
<p>Soldering terminals may shift in the x, y direction.</p>	<p>Unit: mm</p>

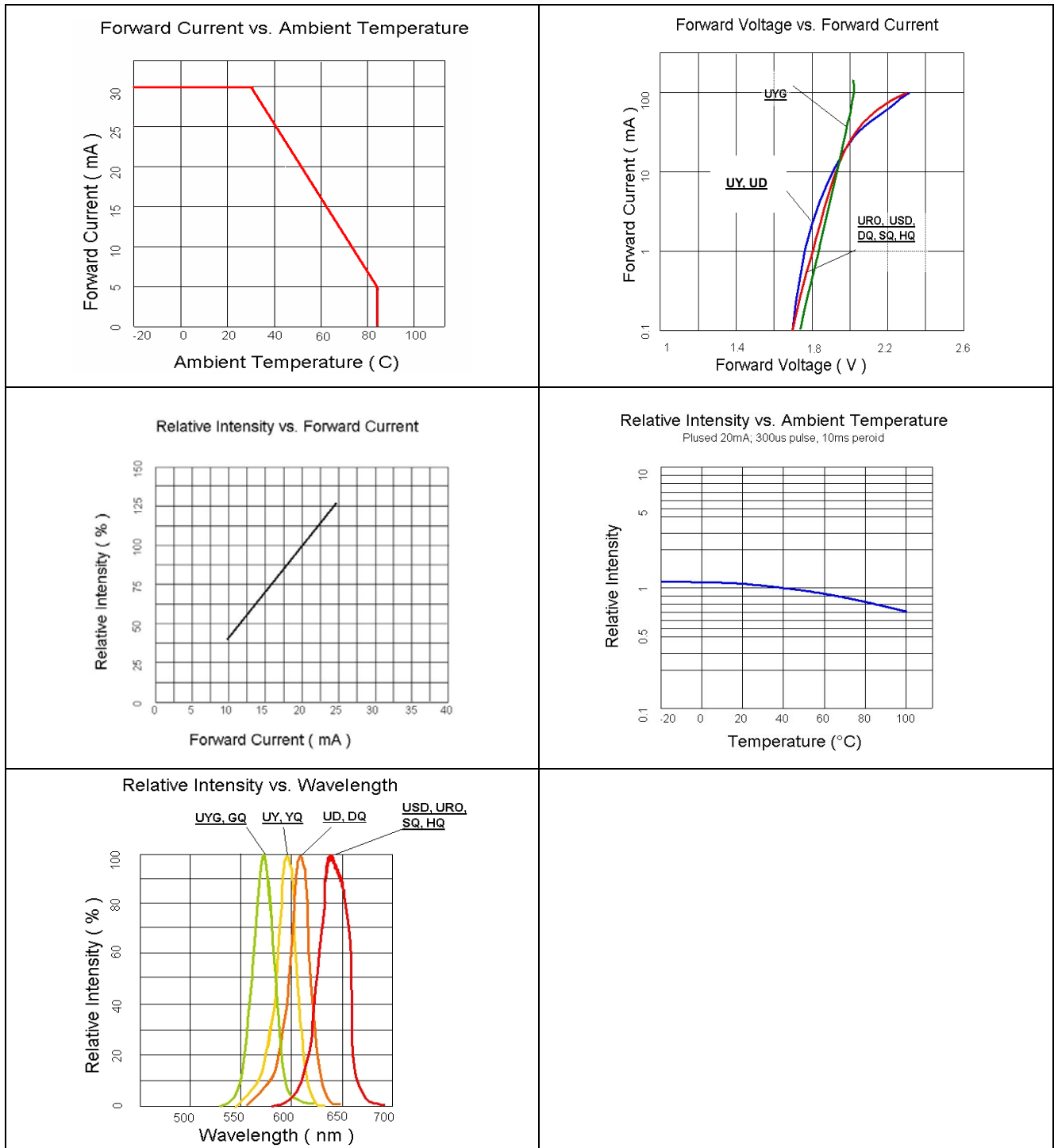
Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0 Page 12/24

Characteristic Curves for YG, Y, D and SD



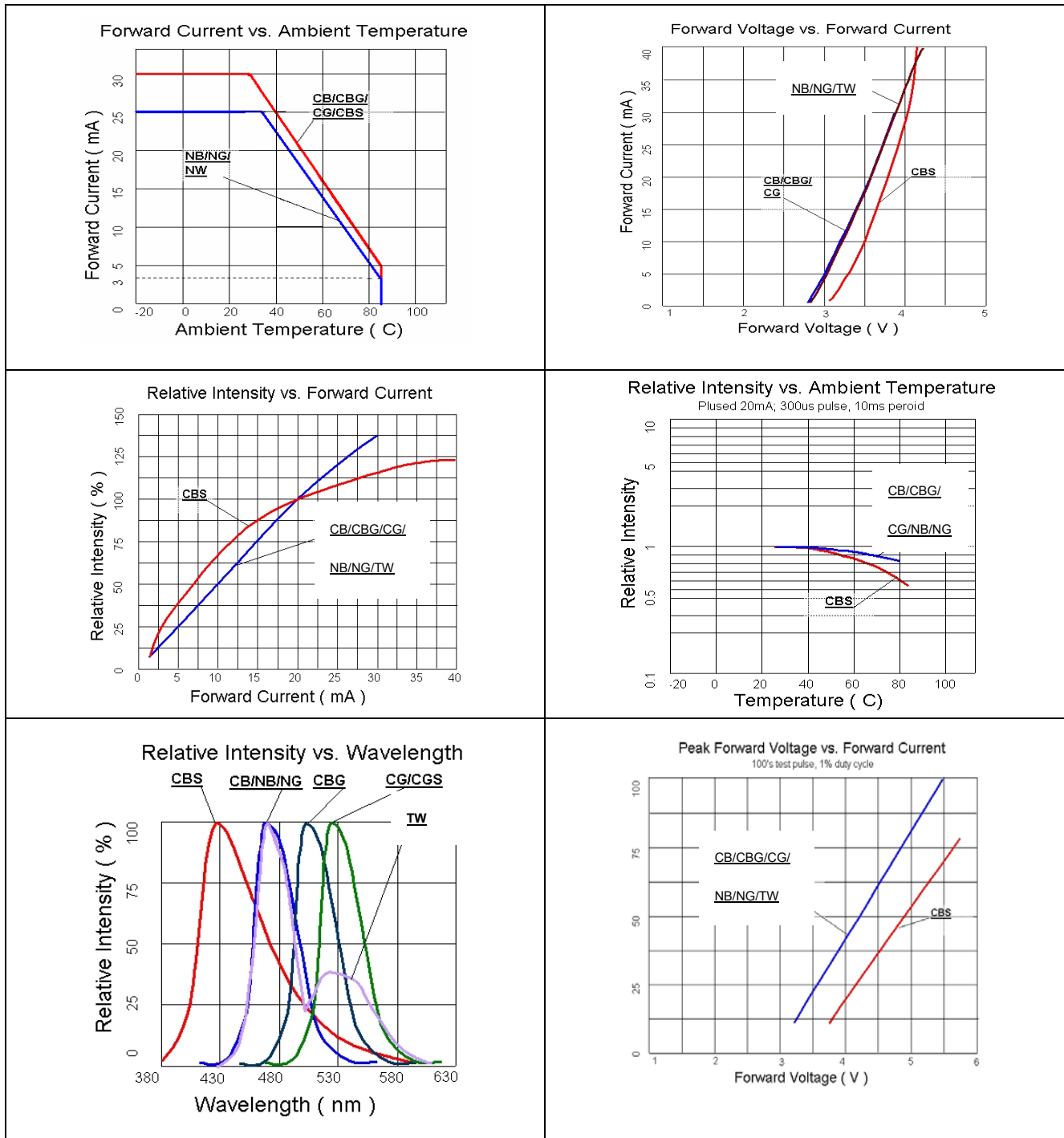
Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 13/24

Characteristic Curves for UYG, UY, UD and USD



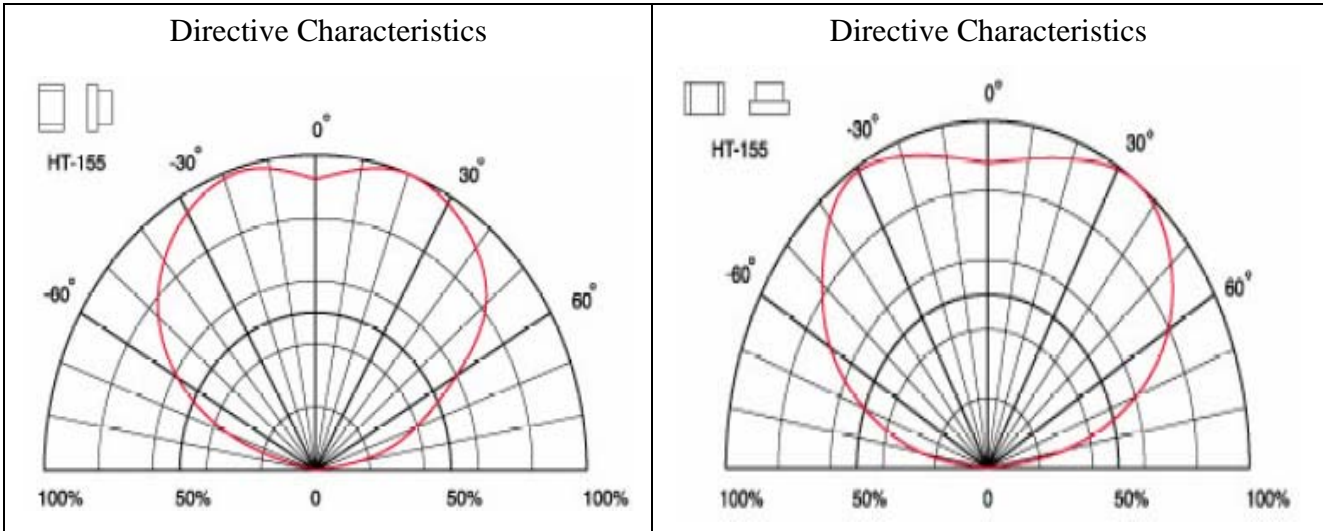
Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 14/24

Characteristic Curves for NB



Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 15/24

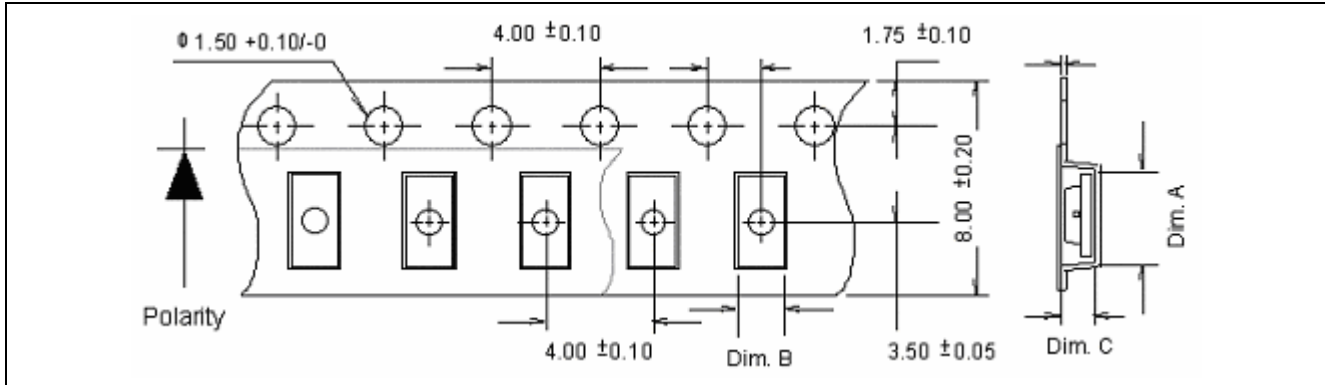
Characteristic Curves for All Colors (Radiation Pattern)



Official Product	Product: HT-155 Series	Data Sheet No.	
Tentative Product	*****	HT-155 Series	
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 16/24

Packaging

Tape Dimension

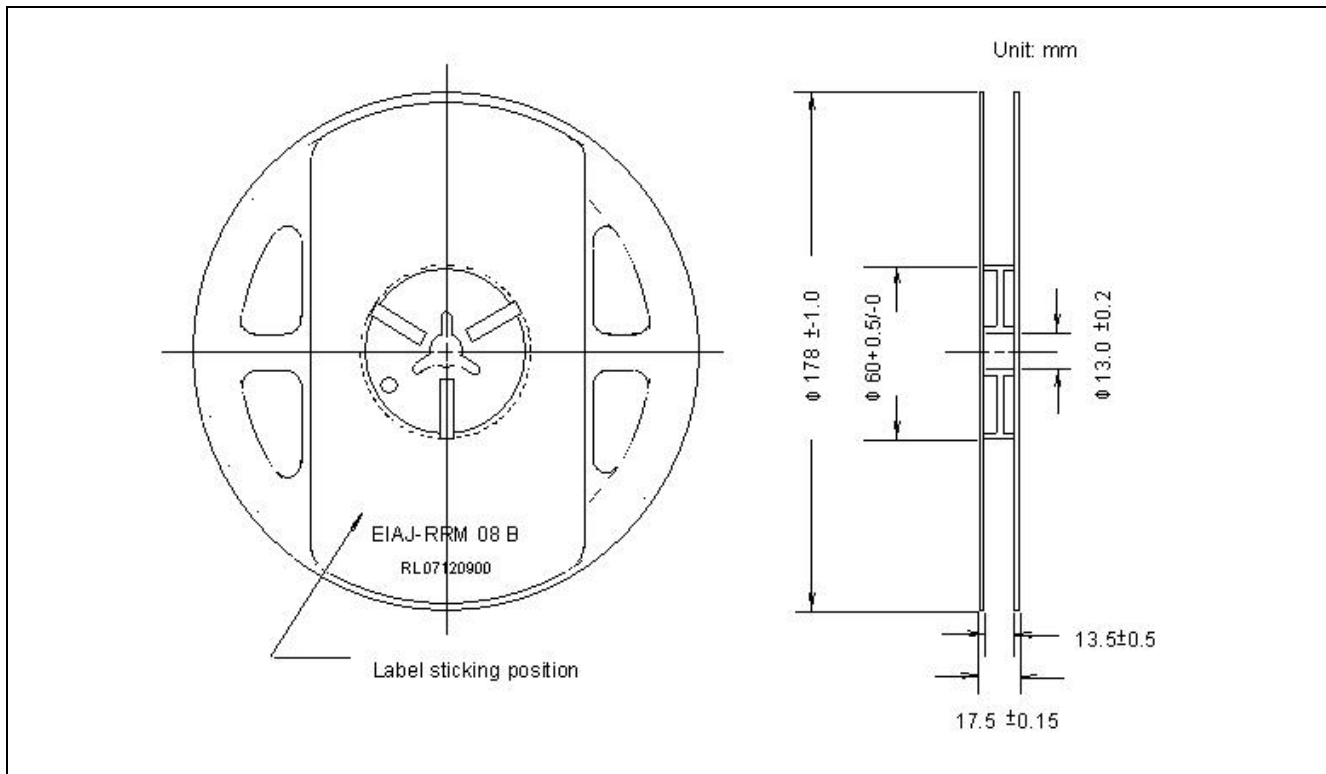


Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-155	3.52±0.10	3.02±0.10	1.40±0.10	3K

Unit: mm

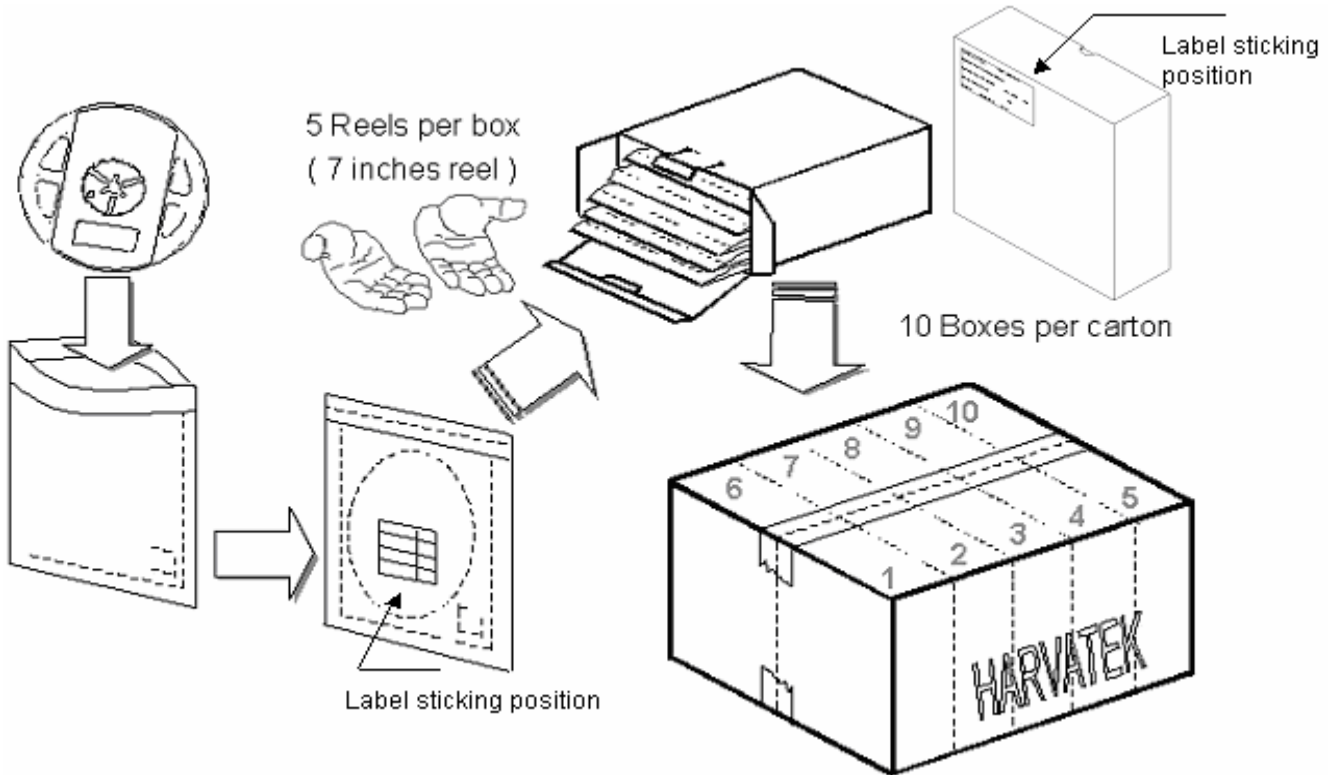
Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.		Aug. 29, 2005	Version of 1.0
			Page 17/24

Reel Dimension



Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 18/24

Packing



5 boxes per carton is available depending on shipment quantity.

	Specification	Material	Quantity
Carrier tape	Per EIA 481-1A specs	Conductive black tape	3000pcs 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.

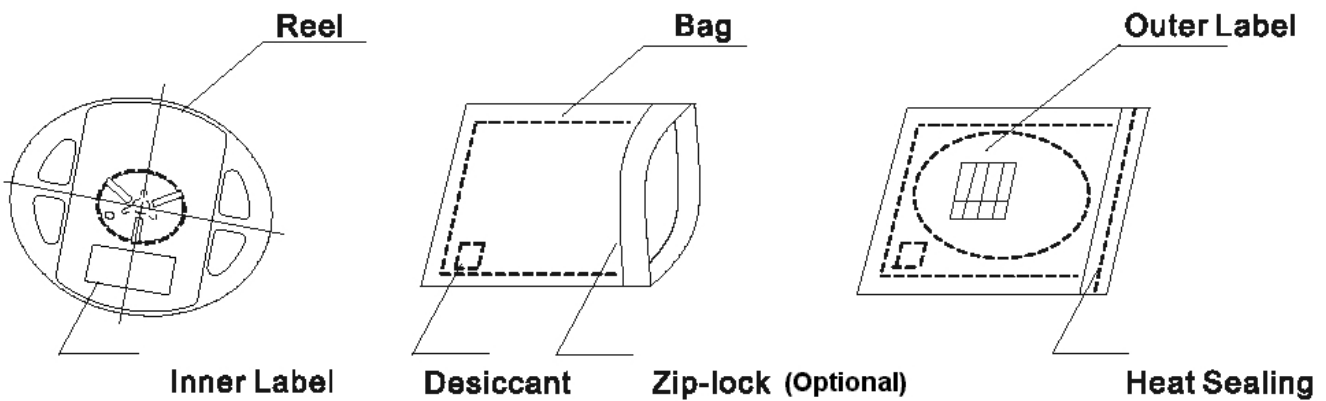
Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 19/24

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:

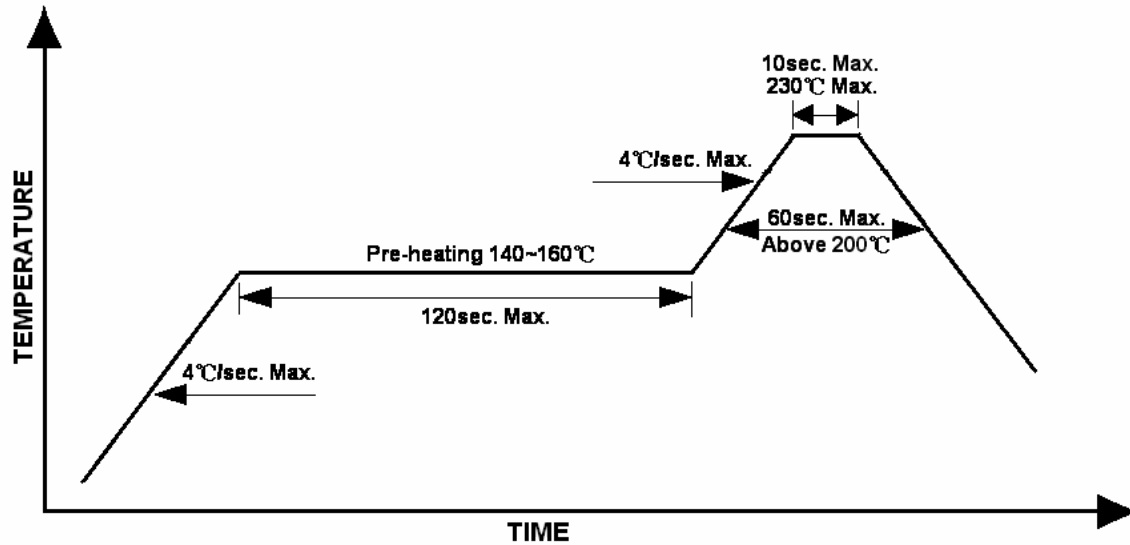


Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 20/24

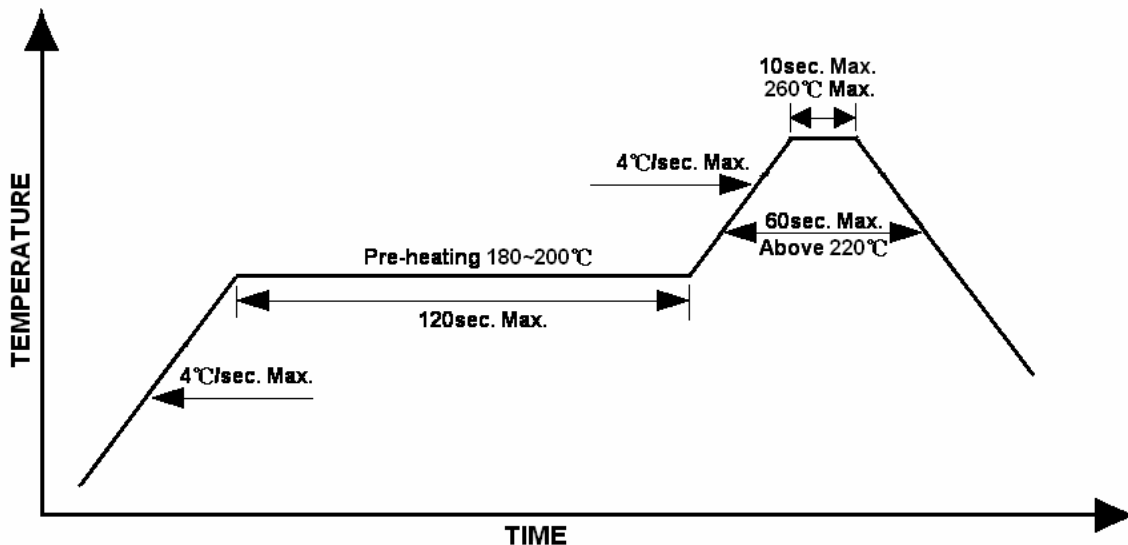
Reflow Soldering

- 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



Official Product	Product: HT-155 Series	Data Sheet No.
Tentative Product	*****	HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0
		Page 21/24

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.

Official Product	Product: HT-155 Series			Data Sheet No.
Tentative Product	*****			HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 22/24	

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=125µs,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

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 23/24

Revision History

Changes since last revision	Page	Version No.	Revision Date
New format		1.0	08-29-2005

Official Product	Product: HT-155 Series		Data Sheet No.
Tentative Product	*****		HT-155 Series
Specifications are subject to change without notice. Data and drawings herein are copyrighted.	Aug. 29, 2005	Version of 1.0	Page 24/24