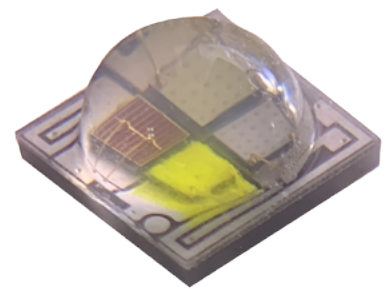


# Federal Series

# 5050 15W RTBW

## Stage Lighting

## Datasheet

Decorative  
LightingMood  
LightingStage  
Lighting

### Features :

- Available in red, green, blue and white in a single package
- Maximum drive current per LED die :  
Red : 1000mA ; True Green/Blue/Cool White : 1500mA
- Individually addressable LEDs
- Electrically neutral thermal path
- RoHS compliant

### Typical Applications :

- Stage lighting
- Color-changing lighting
- Mood lighting
- Architectural lighting
- Entertainment lighting
- Indoor directional lighting

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## General Information

### Introduction

Federal 5050 series is a surface mount, high efficiency LED with multi-chip package. The compact dimension with multi-chip package provides a higher flexibility for optical design. Its independent addressed design enables Federal 5050 Series to be used in a variety of applications, such as stage lighting, mood lighting, architecture lighting and indoor directional lighting. Federal 5050 Series are carefully tested in order to achieve optimal performance and provide you an extraordinary LED experience.

### Ordering Code Format

$\frac{2}{X1}$      $\frac{F}{X2}$      $\frac{M0}{X3}$      $\frac{15}{X4}$      $\frac{M2}{X5}$      $\frac{xx}{X6}$      $\frac{F03}{X7}$      $\frac{xxx}{X8}$

X1	X2		X3		X4		X5		
Type	Component		Series		Wattage		Color		
2	Emitter	F	Federal	M0	5050	15	15W	M2	RTBW

X6		X7		X8	
Internal code		PCB Board		Serial Number	
-	-	F03	5050	-	-

## Absolute Maximum Ratings

(T<sub>j</sub> = 25°C)

Parameter	Symbol	Value	Units
DC Forward Current	I <sub>F</sub>	Red : 1000 True Green : 1500 Blue : 1500 Cool White : 1500	mA
Reverse Voltage	V <sub>R</sub>	Note 1	V
LED Junction Temperature	T <sub>j</sub>	Red : 125 True Green : 150 Blue : 150 Cool White : 150	°C
Operating Temperature	-	-40 ~ +85	°C
Storage Temperature	-	-40 ~ +125	°C
Soldering Temperature	-	260	°C

Notes:

- LEDs are not designed to drive in reverse bias.
- Proper current derating must be observed to maintain junction temperature below the maximum.

## Characteristics

(I<sub>F</sub> = 1000mA ; per chip ; T<sub>j</sub> = 25°C)

Parameter	Symbol	Value	Units
Viewing Angle	2Θ <sub>1/2</sub>	115	Degree
Forward voltage@1000mA	V <sub>F</sub>	Red : 2.0-2.6 True Green : 2.8-3.5 Blue : 2.8-3.5 Cool White : 2.8-3.5	V
CCT/Wavelength	-	Red : 619 - 630 True Green : 520 - 530 Blue : 450 - 460 Cool White : 5,000-5,700	K/nm
CRI (Ra)	-	70	-
		Level 1	
JEDEC Moisture Sensitivity	-	<b>Floor Life</b> Conditions: ≤30°C / 85% RH	-
		<b>Soak Requirements(Standard)</b> Time (hours): 168+5/-0 Conditions: 85°C / 85% RH	

Notes:

- Edison maintains a tolerance of ±1nm for dominant wavelength.
- Viewing angle is measured with accuracy of ±10%.
- Color rendering index CRI Tolerance : ±2

## Luminous Flux Characteristic

( $T_j = 25^\circ\text{C}$ )

Emitter Type	Color	Ra	WD	Luminous Flux @350mA (lm)	Luminous Flux @700mA (lm)	Luminous Flux @1,000mA (lm)	Luminous Flux @1,500mA (lm)	Order Code
RTBW	Red	-	619-630	70	130	180	-	2FM015M206F03S01
	True Green	-	520-530	140	220	260	330	
	Blue	-	450-460	22	38	50	65	
	Cool White	70	-	160	280	370	490	

Note:

The luminous flux performance is guaranteed within published operating conditions. Edison Opto maintains a tolerance of  $\pm 10\%$  on flux measurements.

## Luminous Flux Bin Code

( $I_f = 1000\text{mA}$ ;  $T_j = 25^\circ\text{C}$ )

Color	Group	Min. Luminous Flux (lm)	Max. Luminous Flux (lm)
Red	B	130	230
True Green	B	220	340
Blue	B	30	60
Cool White	B	290	410

Note:

Edison Opto maintains a tolerance of  $\pm 10\%$  on flux measurements.

## Wavelength Bin Code

( $I_f = 1000\text{mA}$ ;  $T_j = 25^\circ\text{C}$ )

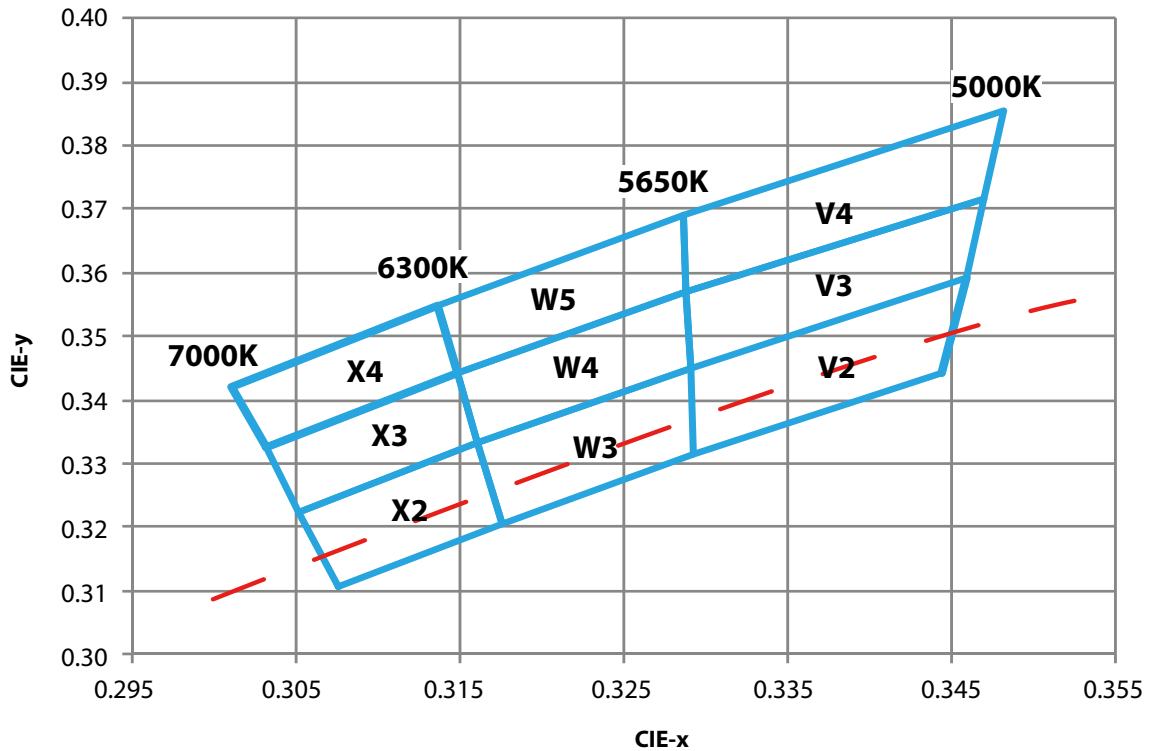
Color	Group	Min. Wd (nm)	Max. Wd (nm)
Red	X	619	630
True Green	W	520	525
	X	525	530
Blue	U	450	455
	V	455	460

Note:

Dominant wavelength measurement allowance:  $\pm 1\text{nm}$ .

## Color Bin Code

( $I_f=1000\text{mA}$  ;  $T_j=25^\circ\text{C}$ )



V2		V3		V4	
X	Y	X	Y	X	Y
0.3292	0.3313	0.3290	0.3451	0.3288	0.3569
0.3290	0.3451	0.3288	0.3569	0.3286	0.3690
0.3458	0.3592	0.3469	0.3717	0.3481	0.3856
0.3444	0.3442	0.3458	0.3592	0.3469	0.3717

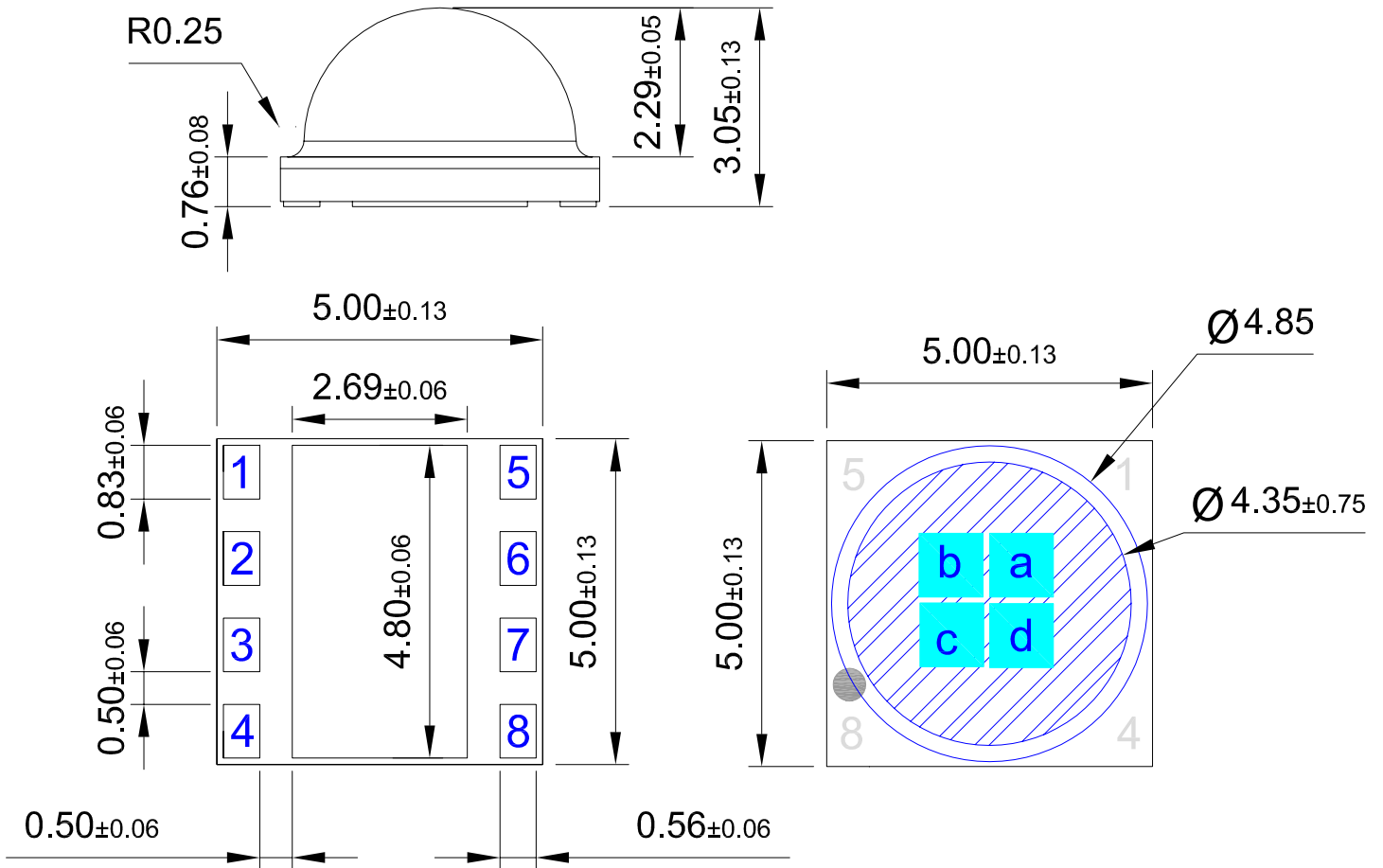
W3		W4		W5	
X	Y	X	Y	X	Y
0.3290	0.3451	0.3290	0.3451	0.3148	0.3444
0.3292	0.3313	0.316	0.3332	0.3136	0.3550
0.3175	0.3204	0.3148	0.3444	0.3286	0.3690
0.3160	0.3332	0.3288	0.3569	0.3288	0.3569

X2		X3		X4	
X	Y	X	Y	X	Y
0.3076	0.3108	0.3052	0.3224	0.3031	0.3327
0.3052	0.3224	0.3031	0.3327	0.3011	0.3422
0.3160	0.3332	0.3148	0.3444	0.3136	0.3550
0.3175	0.3204	0.3160	0.3332	0.3148	0.3444

Note:  
CIE\_x/y tolerance:  $\pm 0.005$ .

## Mechanical Dimensions

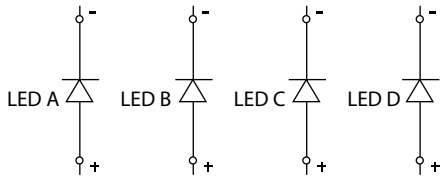
### Emitter Type Dimension



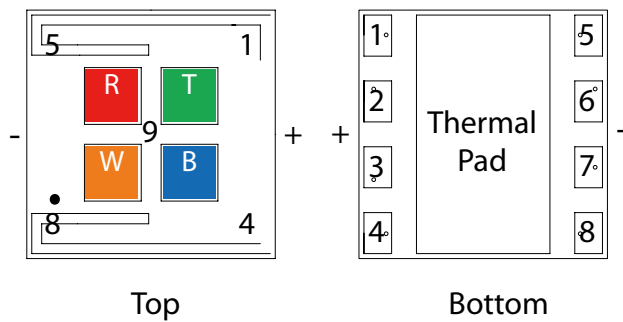
Unless otherwise specified tolerance:  $\pm 0.1$   
Unit: mm

Note:  
1. Drawings are not to scale.

## Circuit



## PCB Layout



Pad Configuration

Color	Function	
	Anode	Cathode
True Green	1	5
Red	2	6
Cool White	3	7
Blue	4	8

Note:

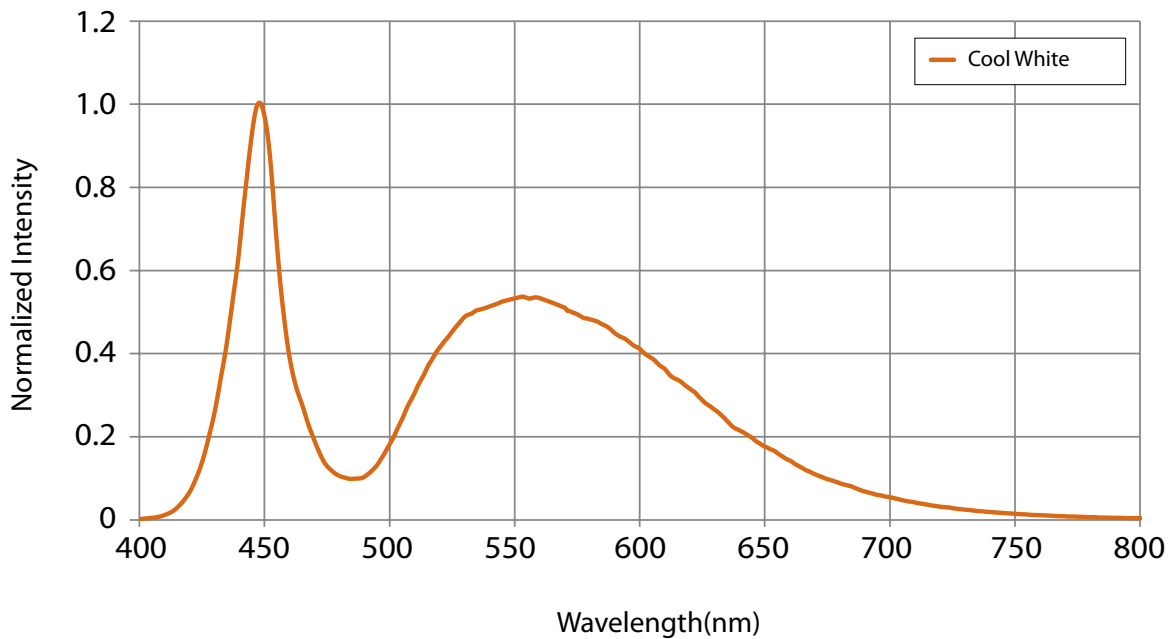
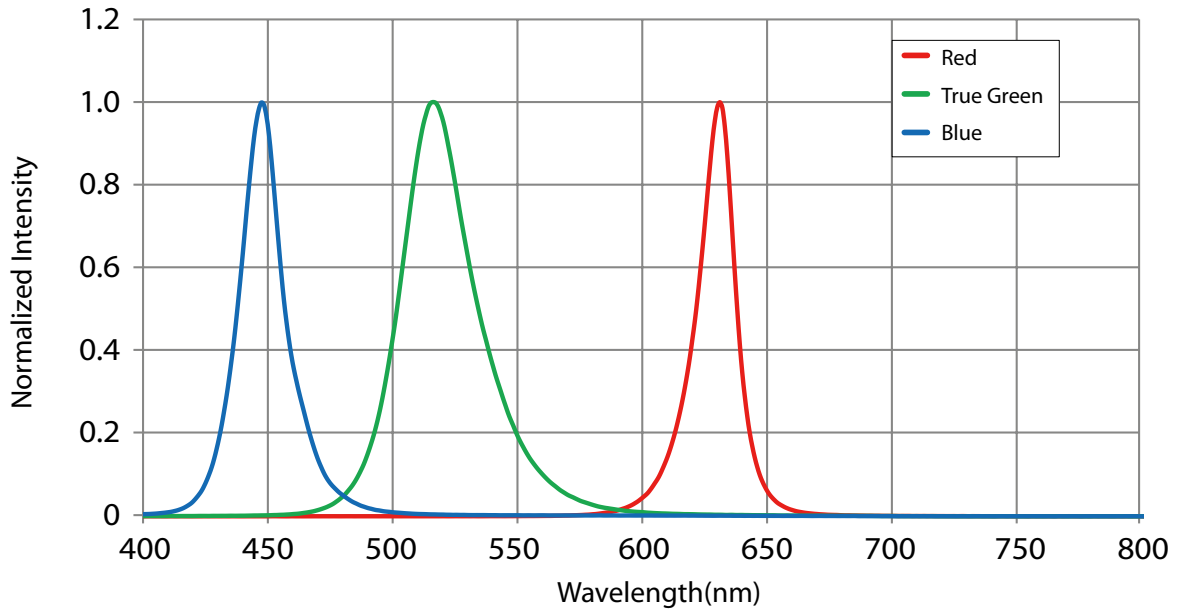
The thermal pad is electrically isolated from anode and cathode.



## Characteristic Curve

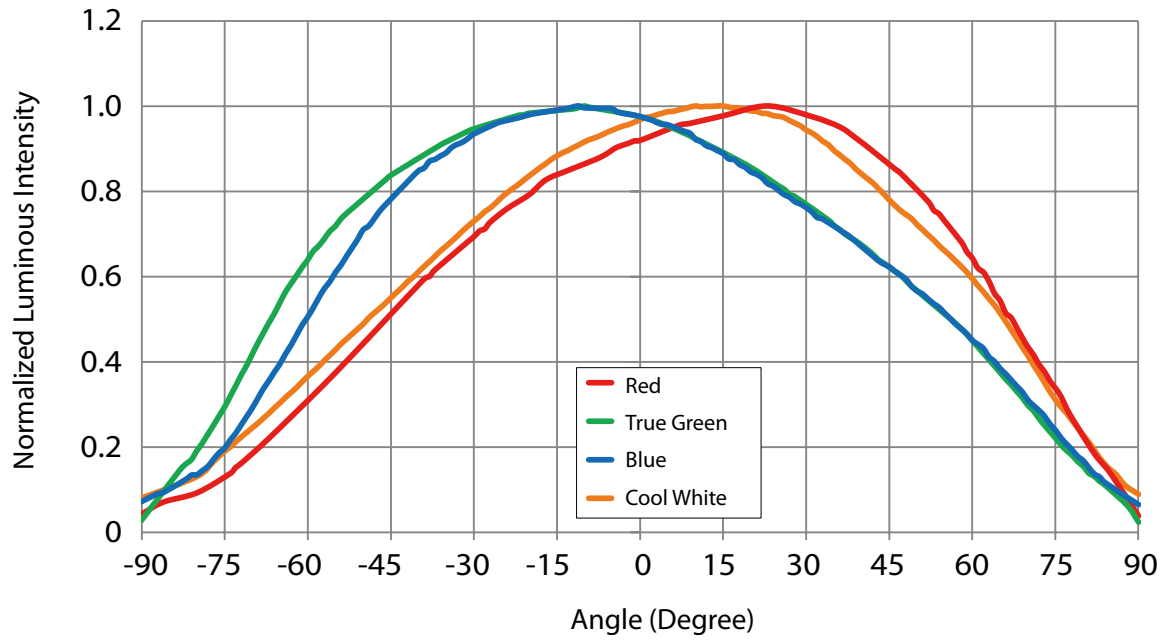
### Color Spectrum

( $I_f=1000\text{mA}$ ;  $T_j=25^\circ\text{C}$ )



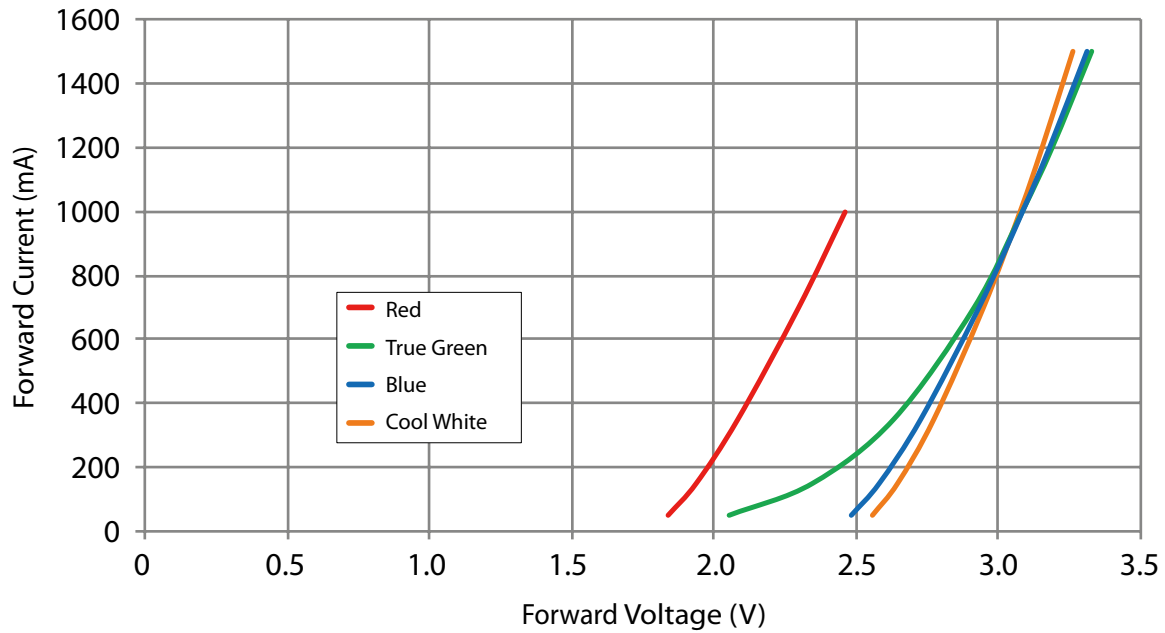
### Beam Pattern

( $T_j = 25^\circ\text{C}$ )



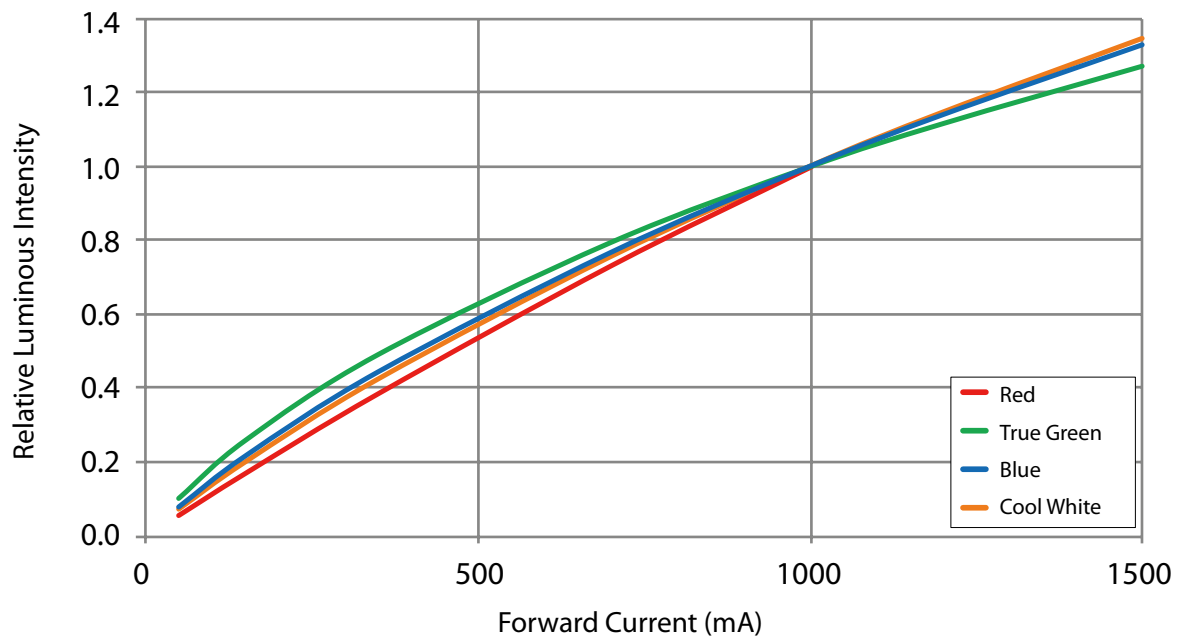
### Forward Current vs. Forward Voltage

$$(I_F = f(V_F); T_J = 25^\circ\text{C})$$



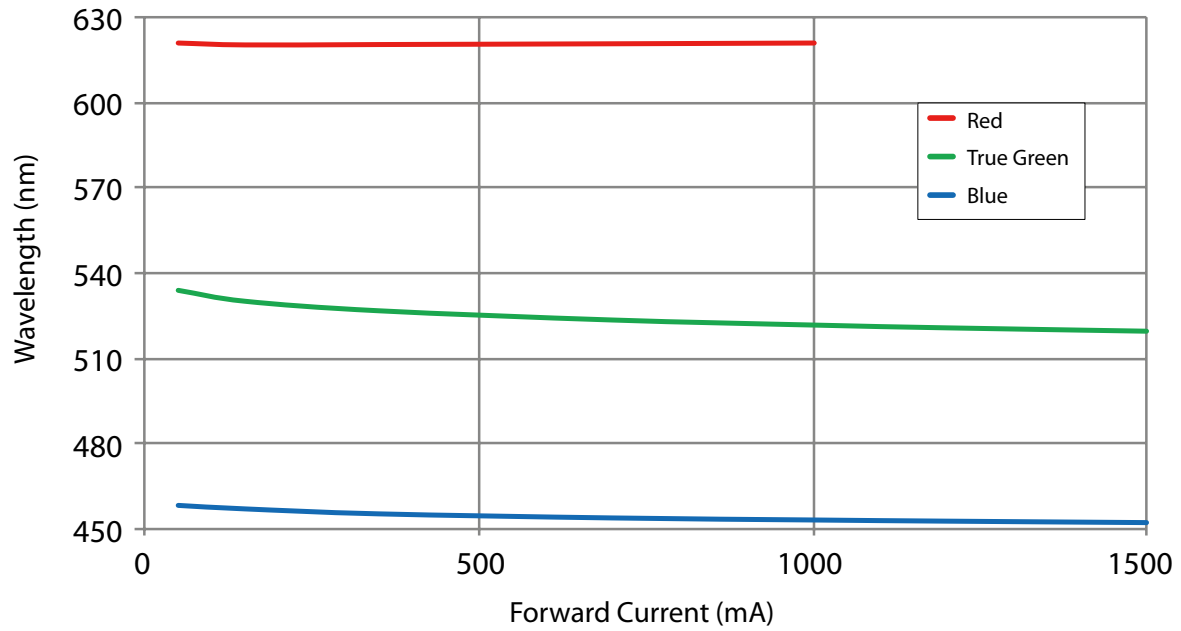
### Relative Luminous Intensity vs. Forward Current

$$(I_V/I_V(1000\text{mA}) = f(I_F); T_J = 25^\circ\text{C})$$



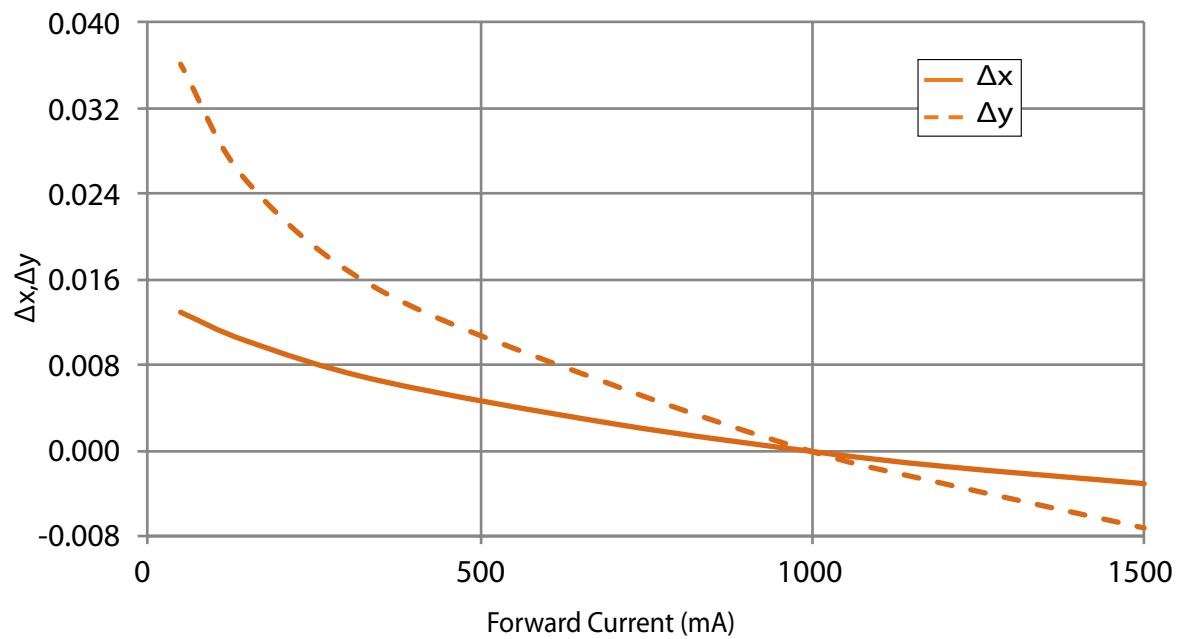
### Wavelength vs. Forward Current

( $T_j = 25^\circ\text{C}$ )



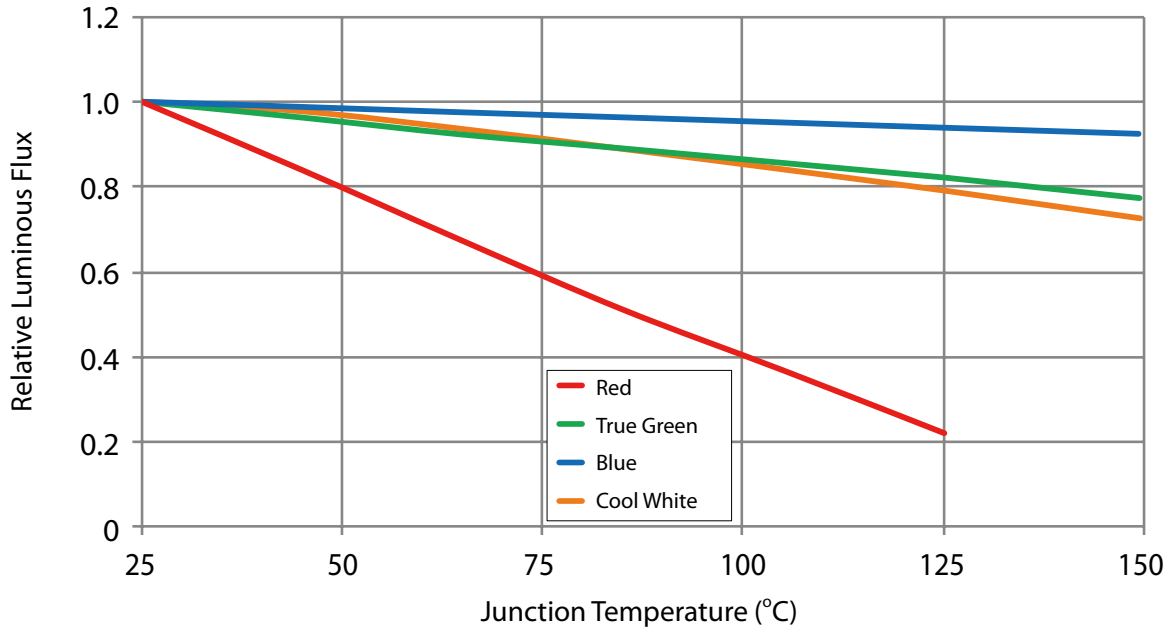
### $\Delta x, \Delta y$ vs. Forward Current (Cool White)

( $\Delta C_x, \Delta C_y = f(I_f)$ ;  $T_j = 25^\circ\text{C}$ )



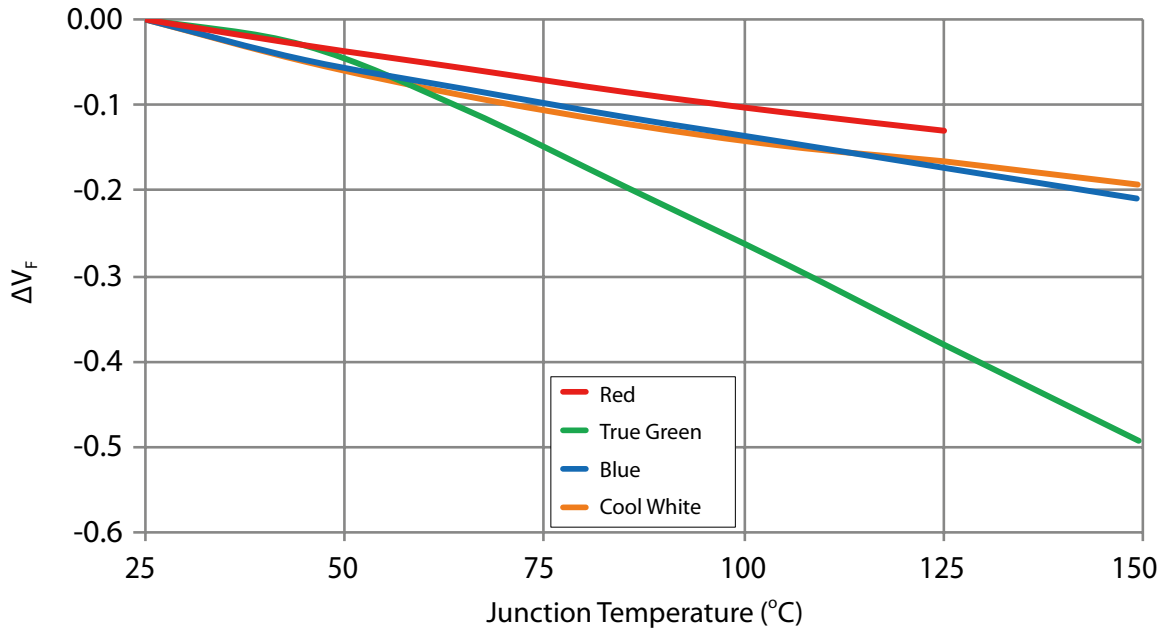
### Relative Luminous Flux vs. Junction Temperature

$(I_V/I_V(25^\circ\text{C}) = f(T_J) ; I_F = 1000\text{mA})$

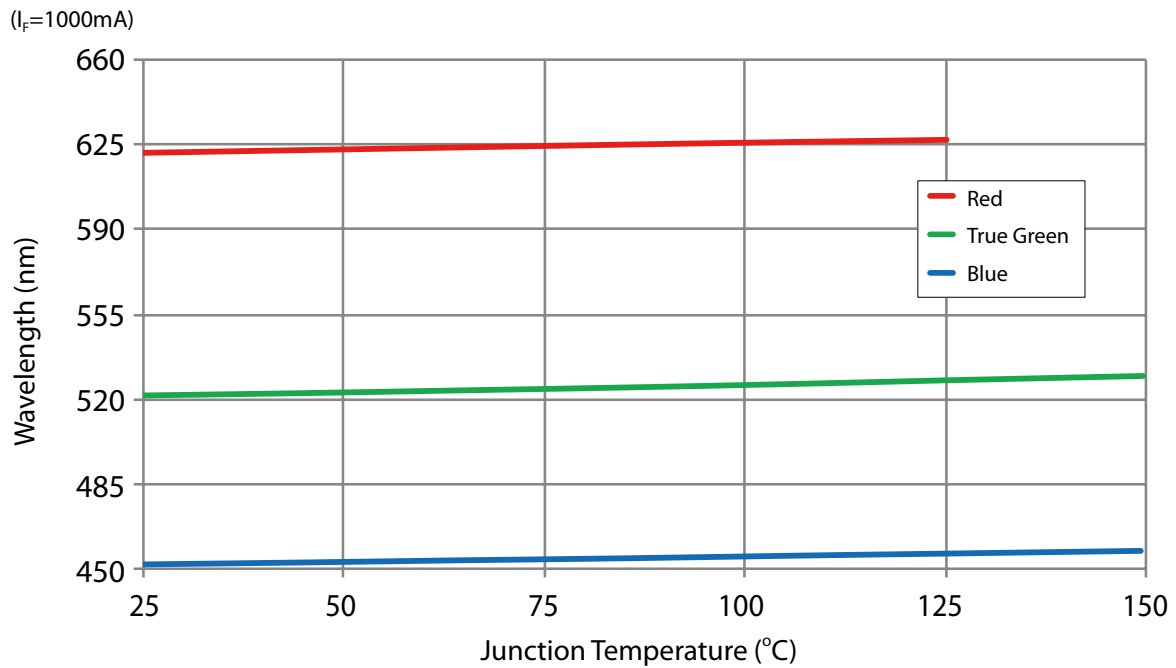


### $\Delta V_F$ vs. Junction Temperature

$(\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_J) ; I_F = 1000\text{mA})$

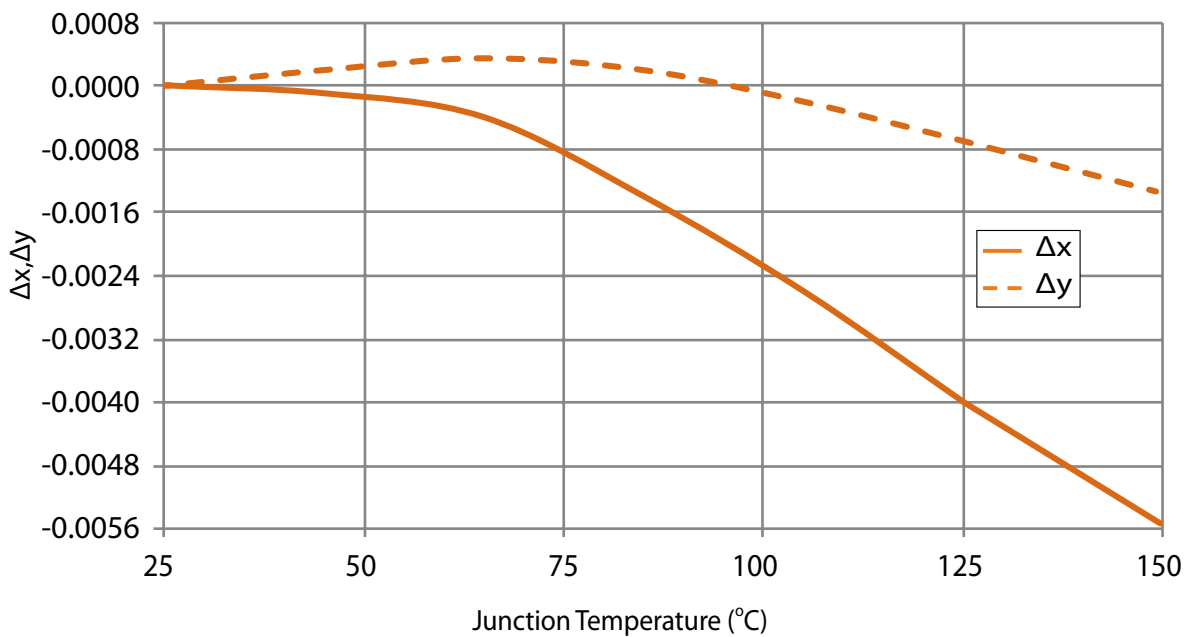


### Wavelength vs. Junction Temperature



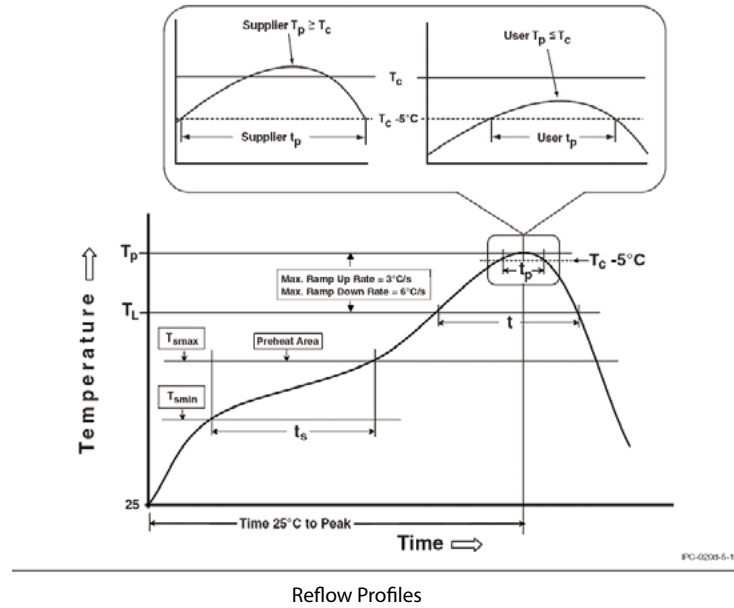
### $\Delta x, \Delta y$ vs. Junction Temperature (Cool White)

( $\Delta C_x, \Delta C_y = f(T_j)$ ;  $I_f = 1000\text{mA}$ )



## Reflow Profile

The following reflow profile is from IPC/JEDEC J-STD-020D which provided here for reference.



Reflow Profiles

## Classification Reflow Profiles

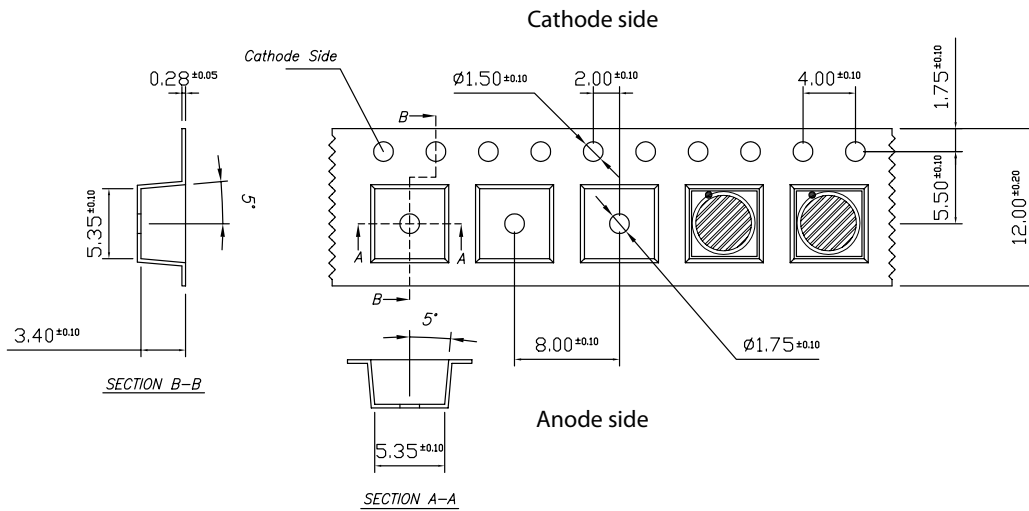
Profile Feature	Pb-Free Assembly
Preheat & Soak Temperature min ( $T_{smin}$ ) Temperature max ( $T_{smax}$ ) Time ( $T_{smin}$ to $T_{smax}$ ) (ts)	150 °C 200 °C 60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max.
Liquidous temperature ( $T_L$ ) Time at liquidous ( $t_L$ )	217 °C 60-150 seconds
Peak package body temperature ( $T_p$ )*	255 °C ~260 °C *
Classification temperature ( $T_C$ )	260 °C
Time ( $t_p$ )** within 5 °C of the specified classification temperature ( $T_C$ )	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

Notes:

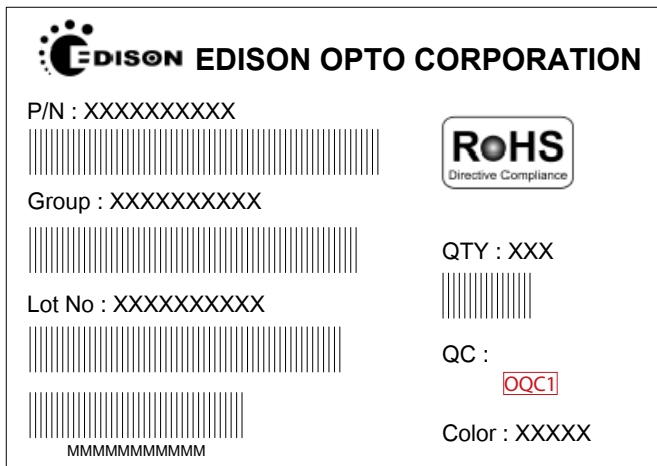
- \* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.
- \*\* Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

## Product Packaging Information

### Tapping



### Product Label



#### Label information

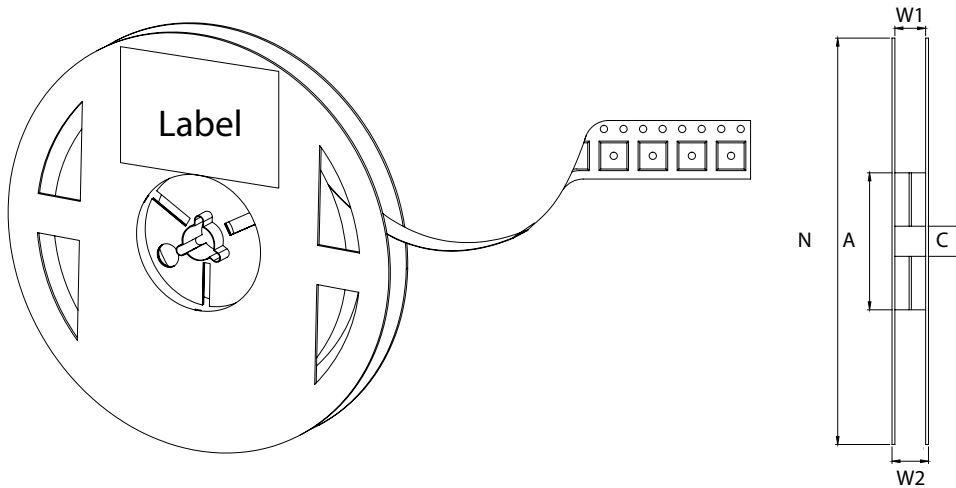
P/N : Order Code  
Group : Bin Code  
Lot No : Lot Number  
QTY : Packing Quantity

### Bin Group Format

X	X	X	X	X	X	X	XX
X1	X2	X3	X4	X5	X6	X7	X8-X9
Red		True Green		Blue		Cool White	
Luminous Flux (lm)	Wavelength (nm)	Luminous Flux (lm)	Wavelength (nm)	Luminous Flux (lm)	Wavelength (nm)	Luminous Flux (lm)	Color Bin

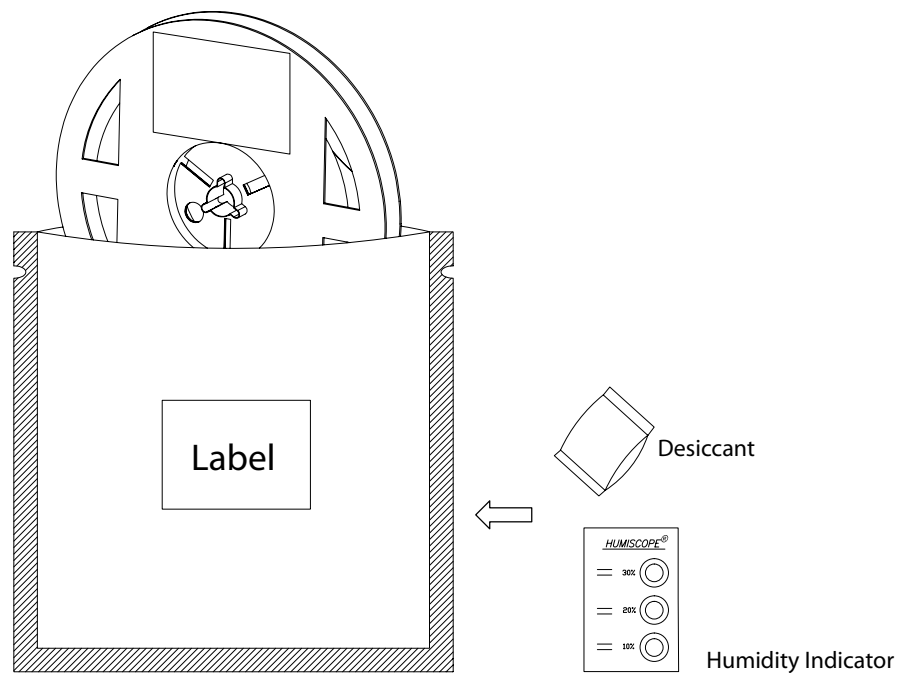


### Tape and Reel



A	C	N	W1	W2	Pieces per Reel
178±1	13.2±0.2	60±0.5	13.5±0.5	16+0.5/-0	≤ 500
Starting with 50pcs empty, and 50pcs empty at the last.					

### Static Bag



## Revision History

Versions	Description	Release Date
0.1	Preliminary	2019/10/29
0.2	Revise Color Bin Code	2019/11/01
0.3	Revise Test Current Information	2020/11/24

## About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at [www.edison-opto.com](http://www.edison-opto.com)

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