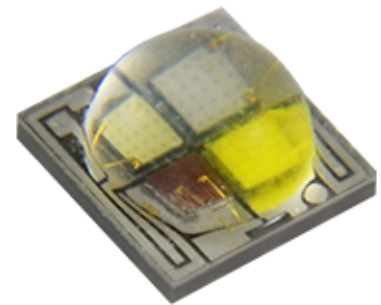


Federal Series

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 : R :1,000 mA ;T/B/W(CW) : 1,200 mA
- 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 smaller and brighter multi-chip LED which provides multi-color packaging flexibility. Federal is a surface mount, compact, high brightness LED that is suitable for various illumination needs such as stage lighting, color-changing lighting, mood lighting, architectural lighting, as well as entertainment lighting and indoor directional lightings. The multi-color LEDs (RGBW) are especially suitable for stage lights, and with its smallest dimensions in the world, enables a higher flexibility for optical design. All the Edison products are carefully tested in order to achieve reliability and optimal performance, for giving you an extraordinary LED experience.

Ordering Code Format

2
X1
F
X2
M 0
X3
1 5
X4
M 2
X5
x x
X6
F 0 3
X7
x x x
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

| Parameter | Symbol | Value | Units |
|---|--------|-----------------------------|-------|
| DC Forward Current ^[1] | I_F | R:1,000 T/B/W(CW): 1,200 | mA |
| Reverse Voltage ^[2] | V_R | Note 2 | V |
| LED Junction Temperature ^[3] | T_J | 125 | °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

| Parameter | Symbol | Value | Units |
|----------------------------|-----------------|---|--------|
| Viewing Angle | $2\Theta_{1/2}$ | 115 | Degree |
| Forward voltage@350mA | V_F | R: 1.5-2.5 T: 2.5-3.5 B / W(CW) : 2.5-3.5 | V |
| CCT/Wavelength | - | R: 620 - 630 T: 520 - 530 B: 450 - 460 W(CW): 5,000-7,000 | K/nm |
| CRI (Ra) | - | CRI70 | - |
| JEDEC Moisture Sensitivity | - | Level 1 Floor Life Conditions: $\leq 30^\circ\text{C}$ / 85% RH Soak Requirements(Standard) Time (hours): 168+5/-0 Conditions: 85°C / 85% RH | - |

Notes:

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

Luminous Flux Characteristic

Luminous Flux Characteristics, $I_f=350\text{mA}$ and $T_j=25^\circ\text{C}$

| 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 | Cool White | 70 | - | 135~155 | 245~265 | 320~350 | 365~395 | 2FM015M206F03S01 |
| | True Green | - | 520-530 | 130~145 | 200~220 | 250~270 | 280~305 | |
| | Blue | - | 450-460 | 18~25 | 35~43 | 45~55 | 50~65 | |
| | Red | - | 620-630 | 65~80 | 125~145 | 175~190 | - | |

Note:

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

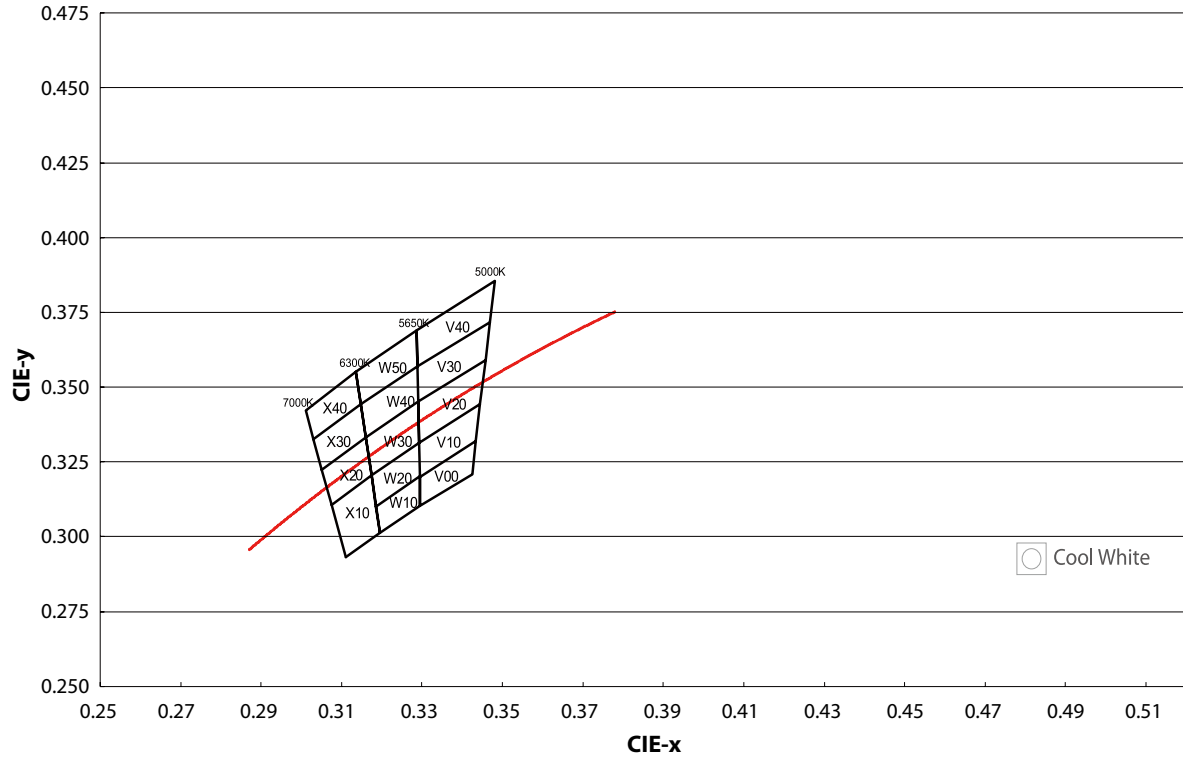
Wavelength Bin Structure

| Color | Group | Min. Wd (nm) | Max. Wd (nm) |
|------------|-------|--------------|--------------|
| Red | X | 620 | 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



| X10 | | X20 | | X30 | | X40 | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| X | Y | X | Y | X | Y | X | Y |
| 0.3076 | 0.3108 | 0.3076 | 0.3108 | 0.3052 | 0.3224 | 0.3031 | 0.3327 |
| 0.3174 | 0.3204 | 0.3052 | 0.3224 | 0.3031 | 0.3327 | 0.3011 | 0.3422 |
| 0.3196 | 0.3013 | 0.3160 | 0.3332 | 0.3148 | 0.3444 | 0.3136 | 0.3550 |
| 0.3112 | 0.2932 | 0.3175 | 0.3204 | 0.3160 | 0.3332 | 0.3148 | 0.3444 |

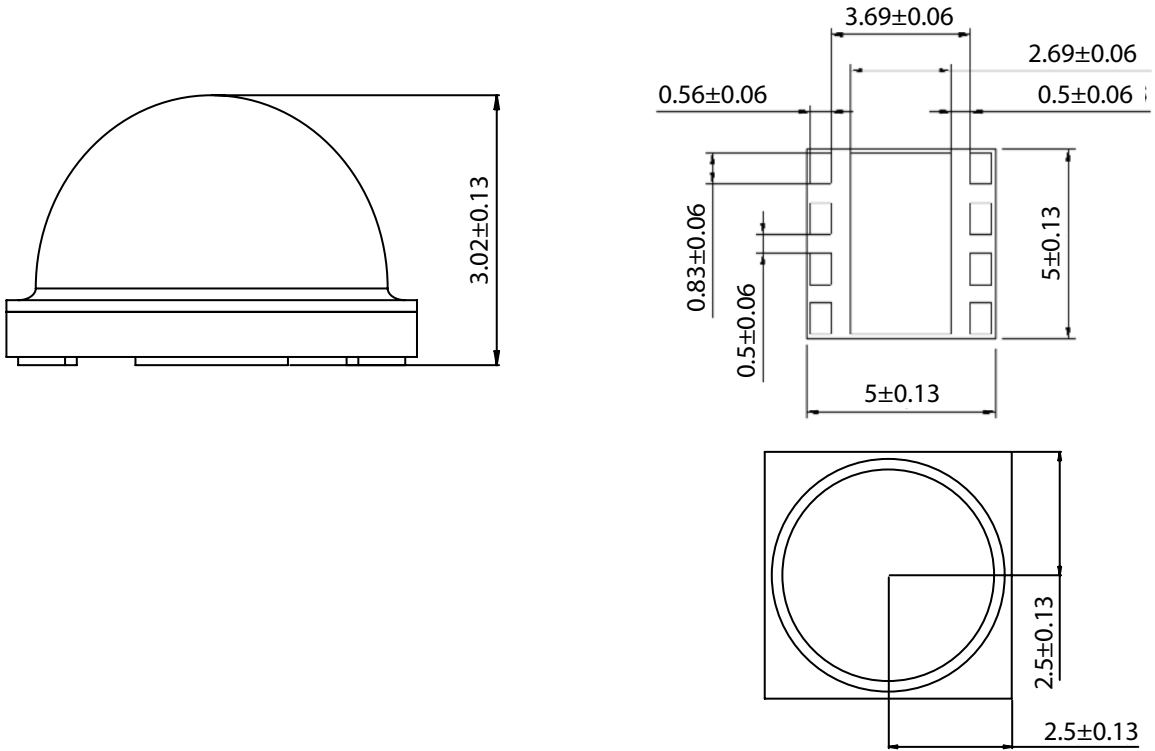
| W10 | | W20 | | W30 | | W40 | | W50 | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X | Y | X | Y | X | Y | X | Y | X | Y |
| 0.3294 | 0.3202 | 0.3292 | 0.3313 | 0.3290 | 0.3451 | 0.3290 | 0.3451 | 0.3148 | 0.3444 |
| 0.3295 | 0.3105 | 0.3294 | 0.3202 | 0.3292 | 0.3313 | 0.3160 | 0.3332 | 0.3136 | 0.3550 |
| 0.3196 | 0.3013 | 0.3186 | 0.3102 | 0.3175 | 0.3204 | 0.3148 | 0.3444 | 0.3286 | 0.3690 |
| 0.3186 | 0.3102 | 0.3175 | 0.3204 | 0.3160 | 0.3332 | 0.3288 | 0.3569 | 0.3288 | 0.3569 |

| V00 | | V10 | | V20 | | V30 | | V40 | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X | Y | X | Y | X | Y | X | Y | X | Y |
| 0.3434 | 0.3320 | 0.3292 | 0.3313 | 0.3292 | 0.3313 | 0.3290 | 0.3451 | 0.3288 | 0.3569 |
| 0.3425 | 0.3208 | 0.3444 | 0.3442 | 0.3290 | 0.3451 | 0.3288 | 0.3569 | 0.3286 | 0.3690 |
| 0.3295 | 0.3105 | 0.3434 | 0.3320 | 0.3458 | 0.3592 | 0.3469 | 0.3717 | 0.3481 | 0.3856 |
| 0.3294 | 0.3200 | 0.3294 | 0.3200 | 0.3444 | 0.3442 | 0.3458 | 0.3592 | 0.3469 | 0.3717 |

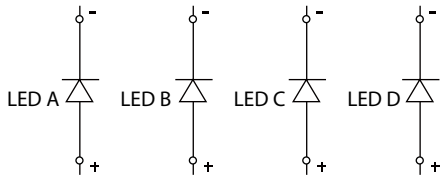
Note:
CIE_x/y tolerance: ± 0.005 .

Mechanical Dimensions

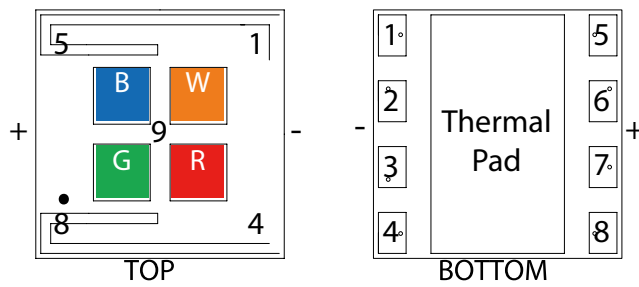
Emitter Type Dimension



Circuit



PCB Layout



Pad Configuration

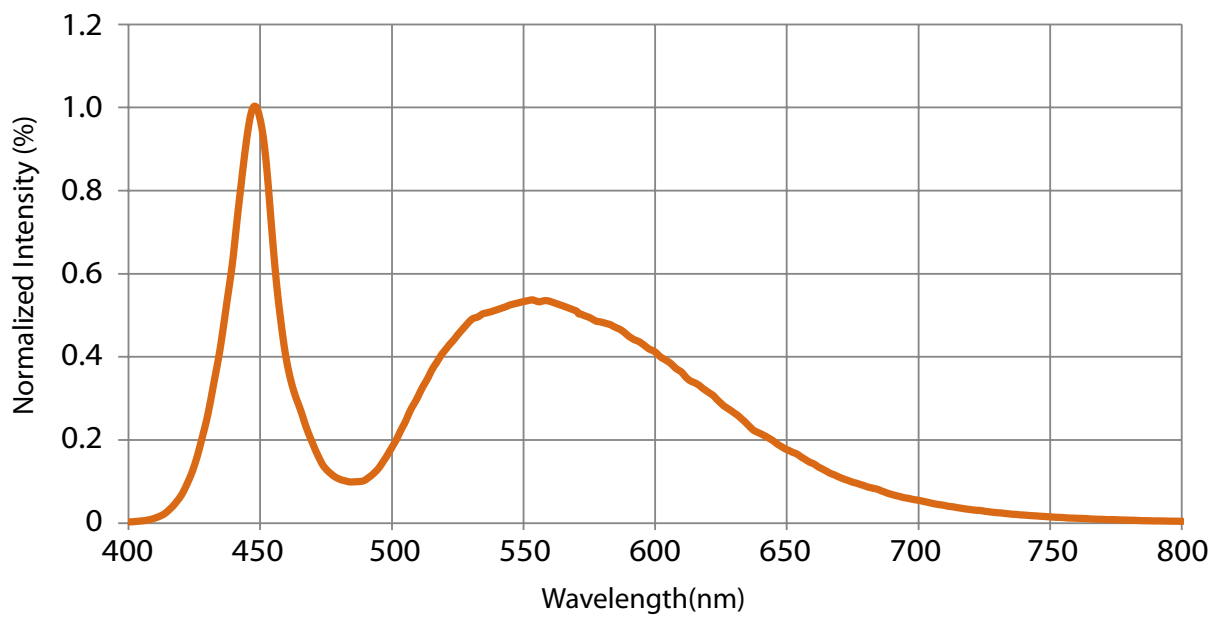
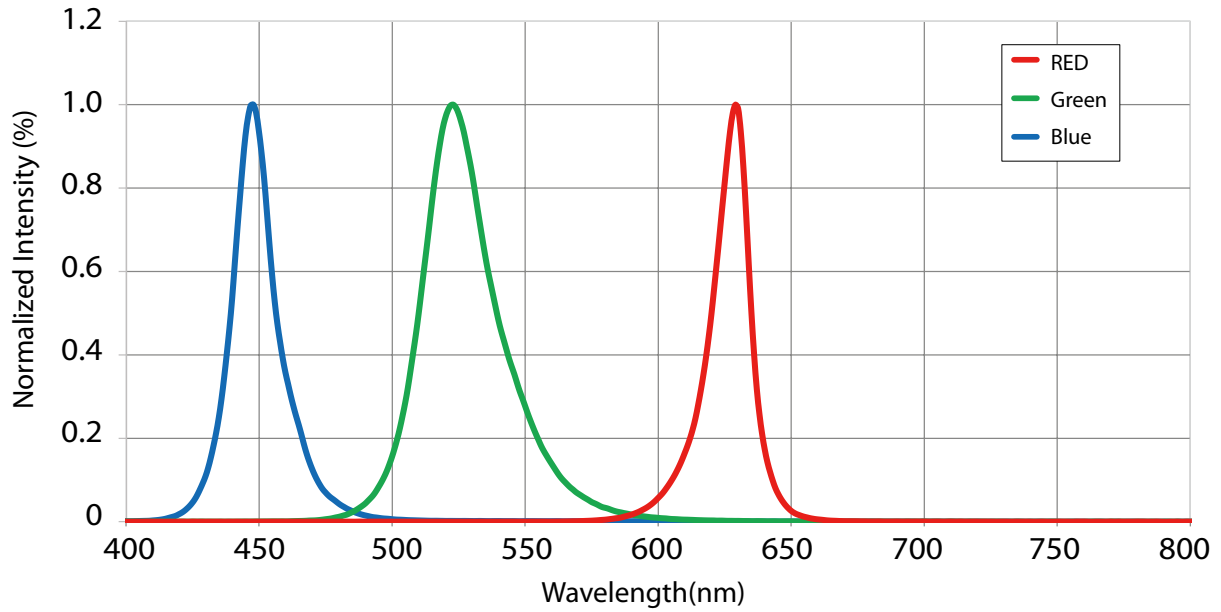
| Color | FUNCTION | |
|-------|----------|---------|
| | Anode | Cathode |
| Blue | 6 | 2 |
| Green | 7 | 3 |
| Red | 8 | 4 |
| CW | 5 | 1 |

Note:

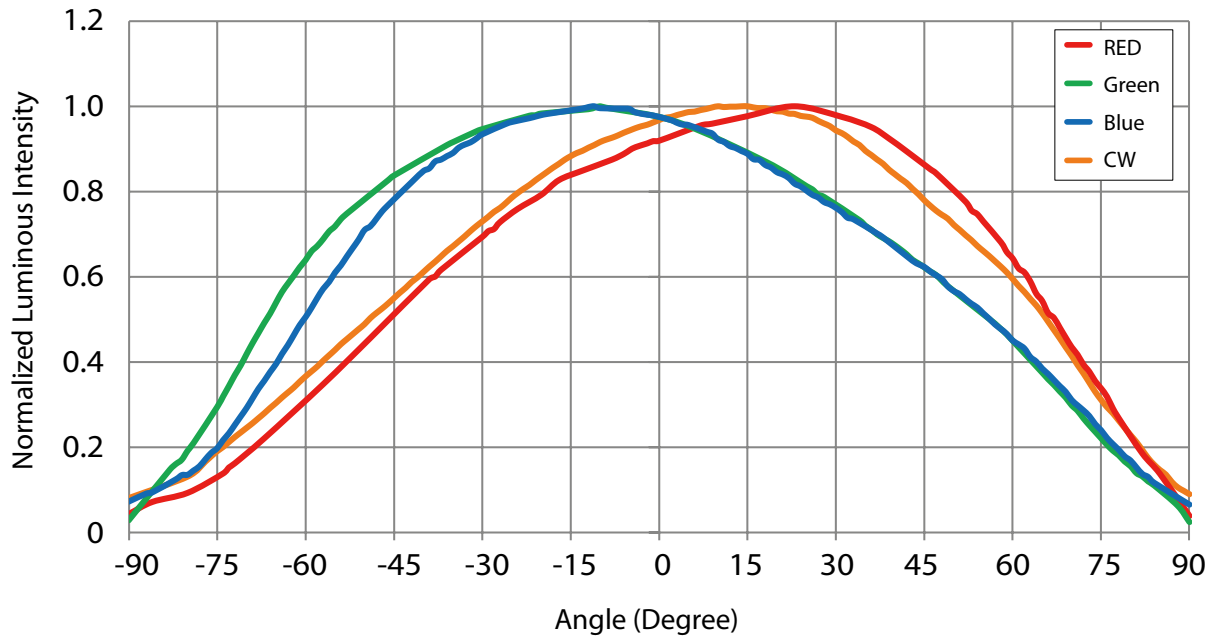
The thermal pad is electrically isolated from anode and cathode.

Characteristic curve

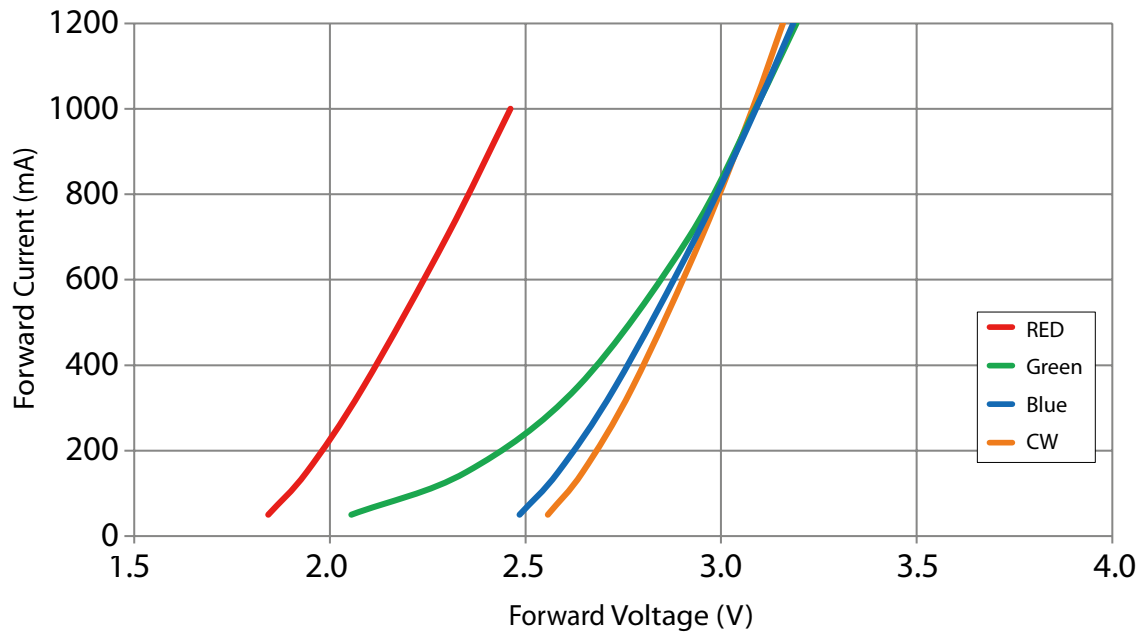
Color Spectrum



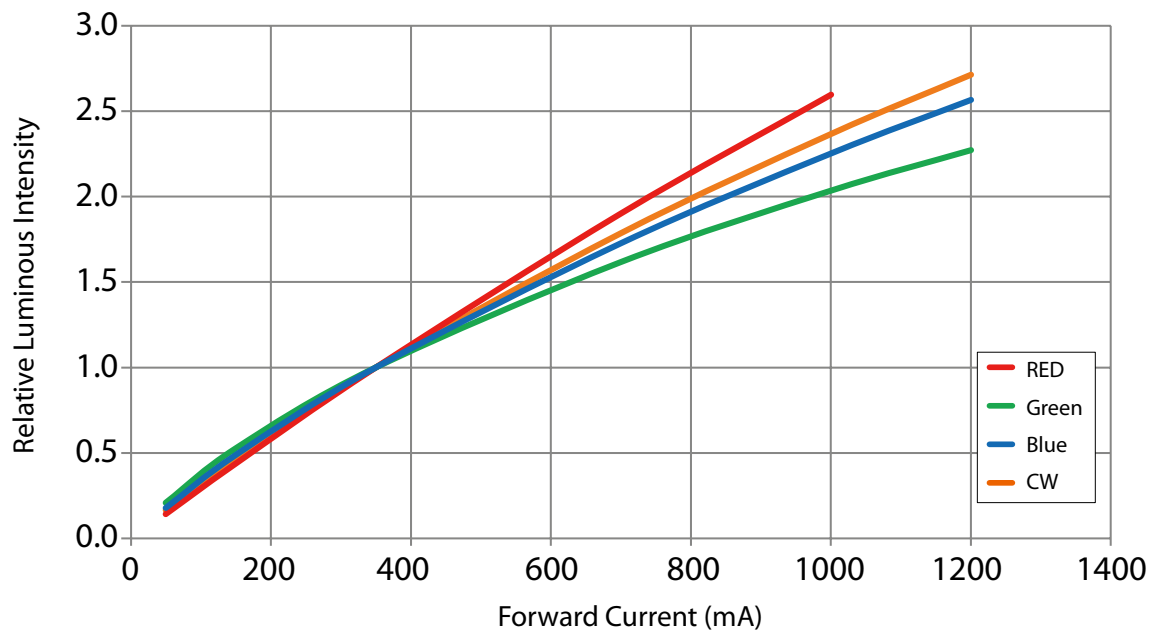
Beam Pattern



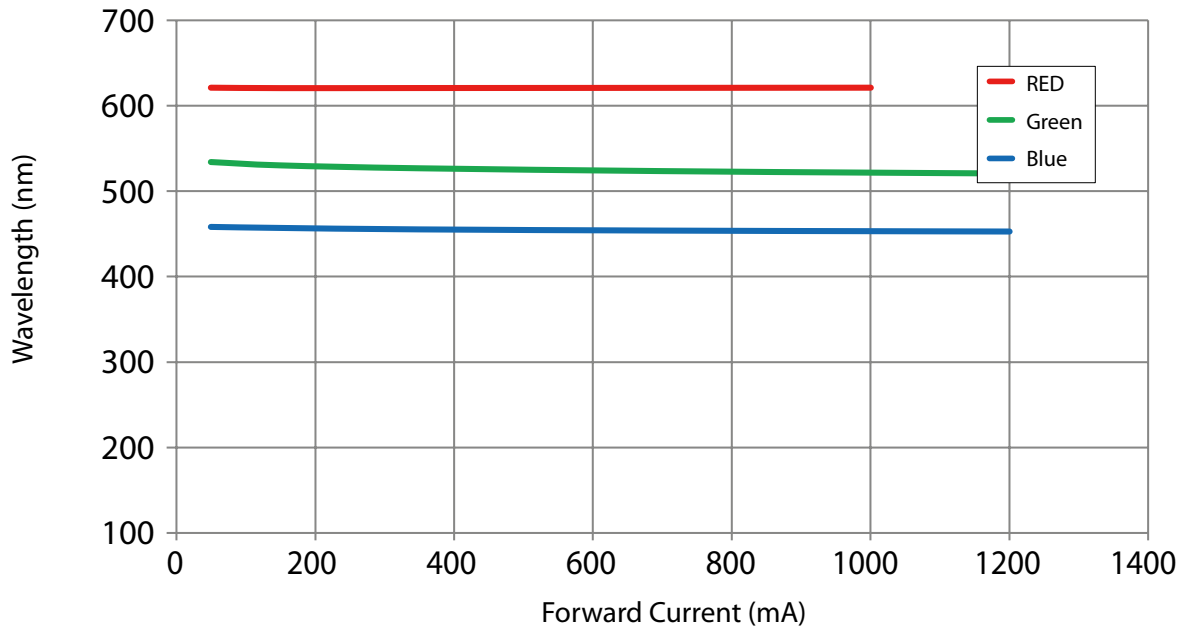
Forward Current vs. Forward Voltage $I_F = f(V_F); T_{\text{ambient}} = 25^\circ\text{C}$



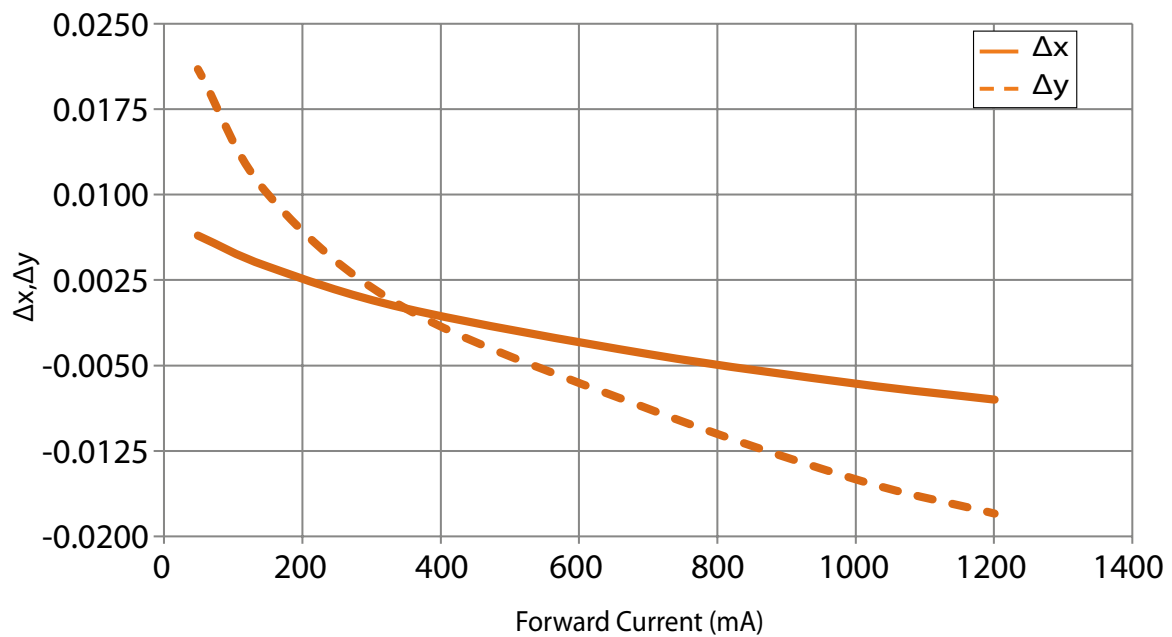
Relative Luminous Intensity vs. Forward Current $I_V/I_V(1000\text{mA}) = f(I_F); T_{\text{ambient}} = 25^\circ\text{C}$



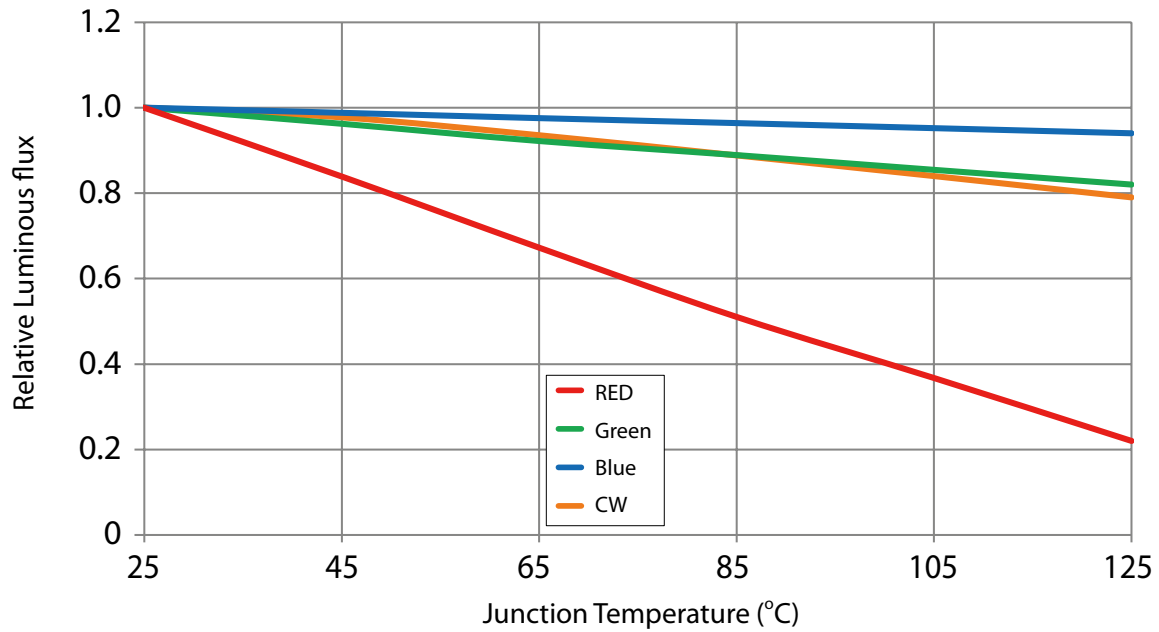
Wavelength vs. Forward Current



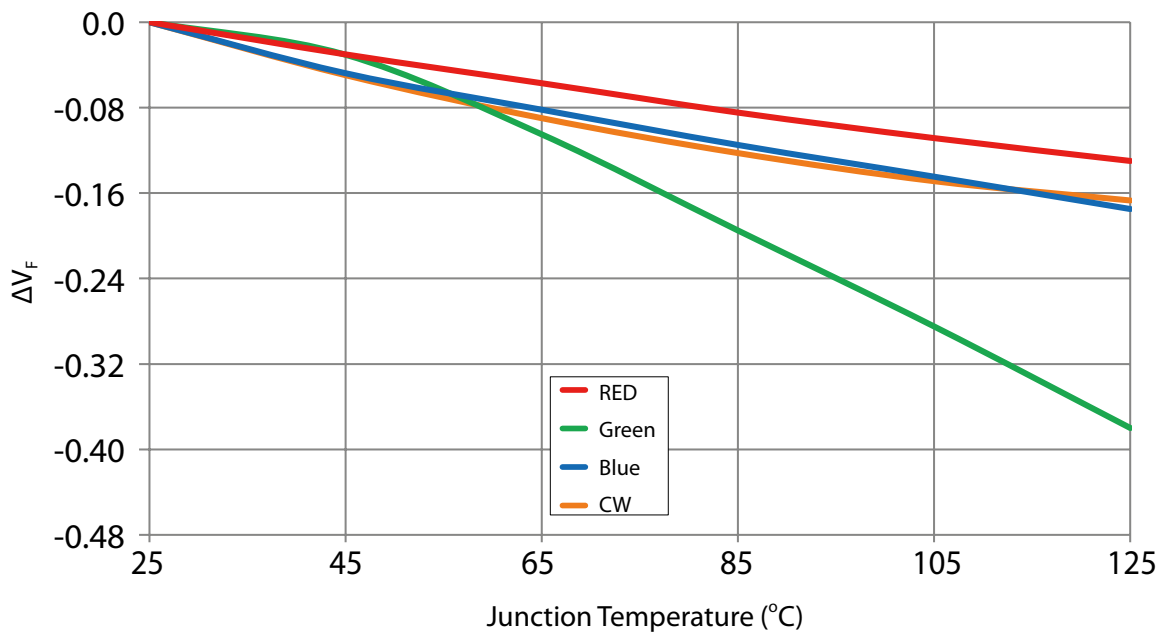
$\Delta x, \Delta y$ vs. Forward Current $\Delta C_x, \Delta C_y = f(I_F); T_{\text{ambient}} = 25^\circ\text{C}$



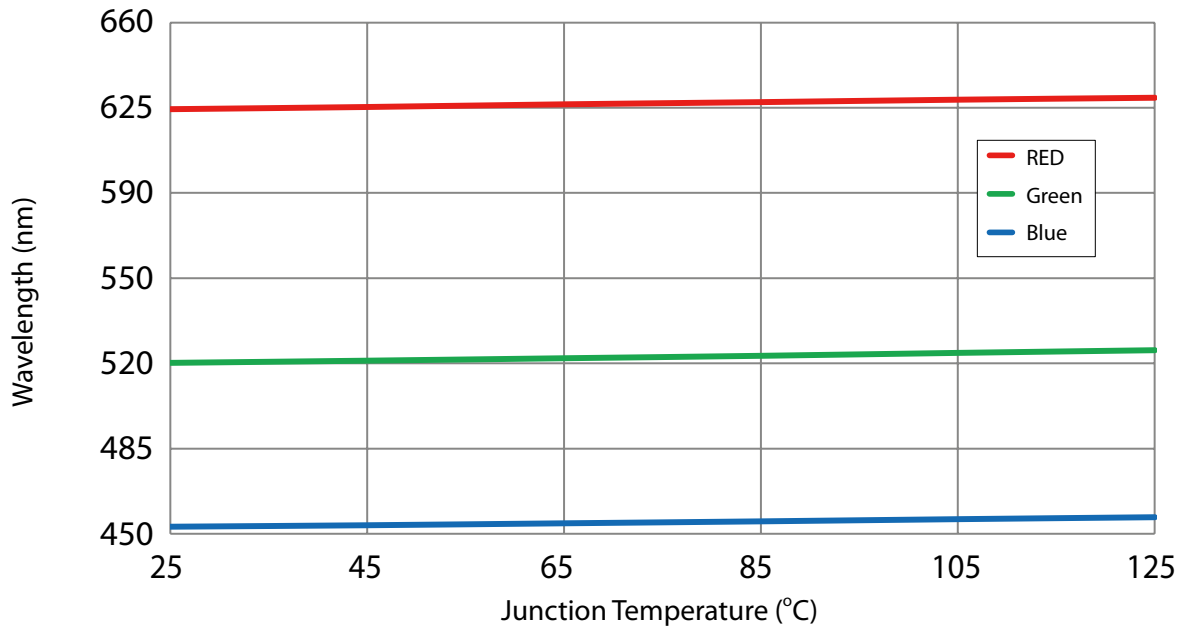
Relative Luminous Flux vs. Junction Temperature $I_V/I_V(25^\circ\text{C}) = f(T_j)$; $I_F = 1000\text{mA}$



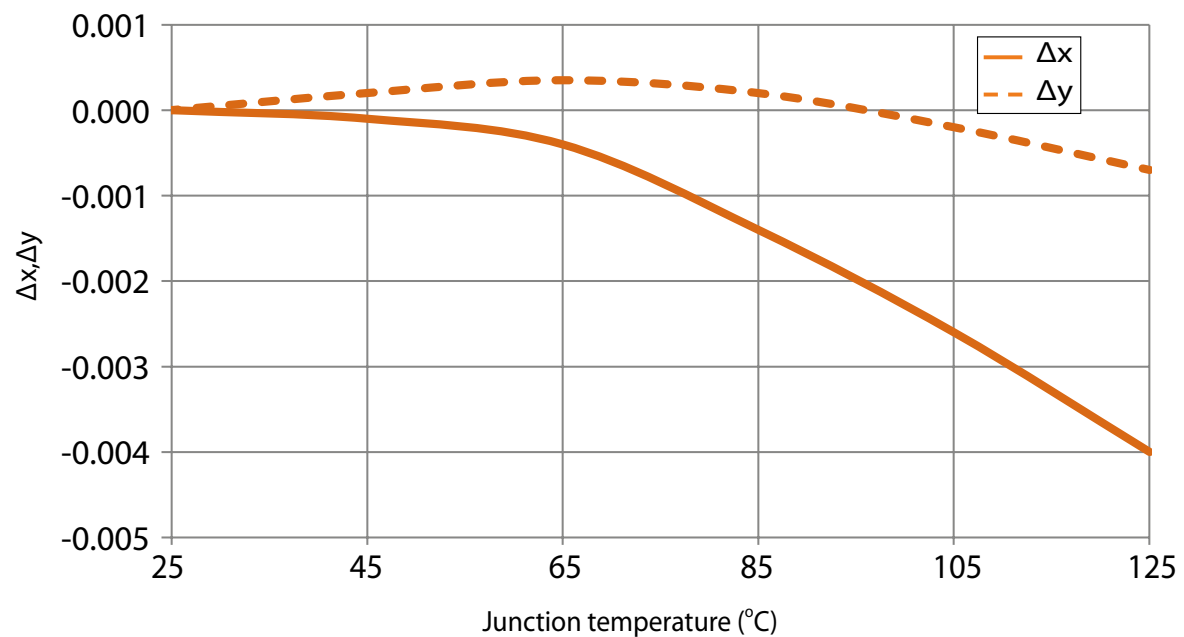
ΔV_F vs. Junction Temperature $\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j)$; $I_F = 1000\text{mA}$



Wavelength vs. Junction Temperature

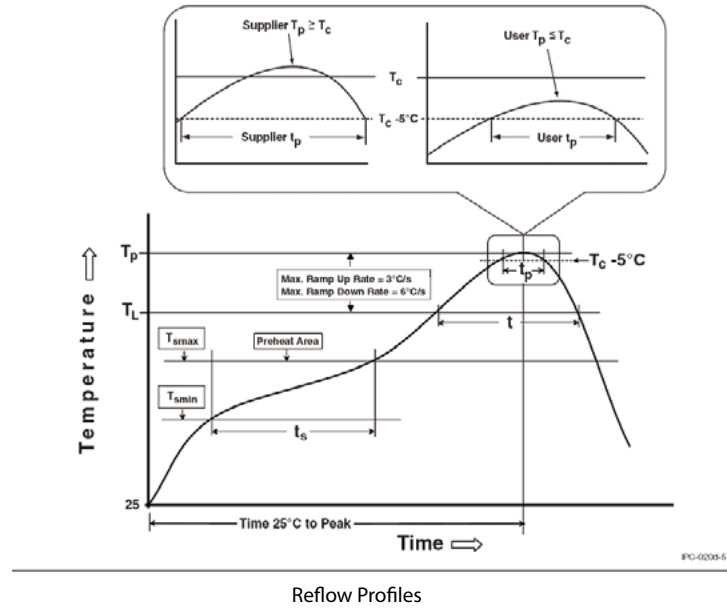


$\Delta x, \Delta y$ vs. Junction Temperature $\Delta C_x, \Delta C_y = f(IF)$; $IF = 1000mA$



Reflow Profile

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



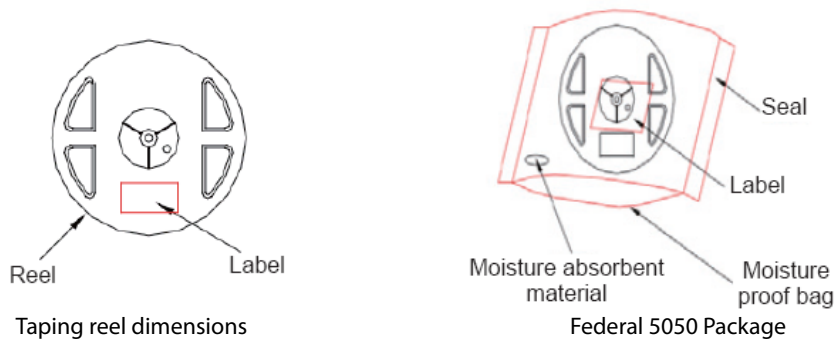
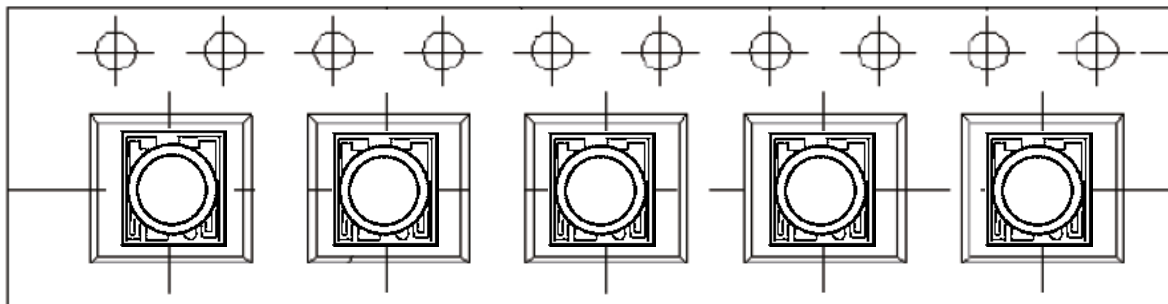
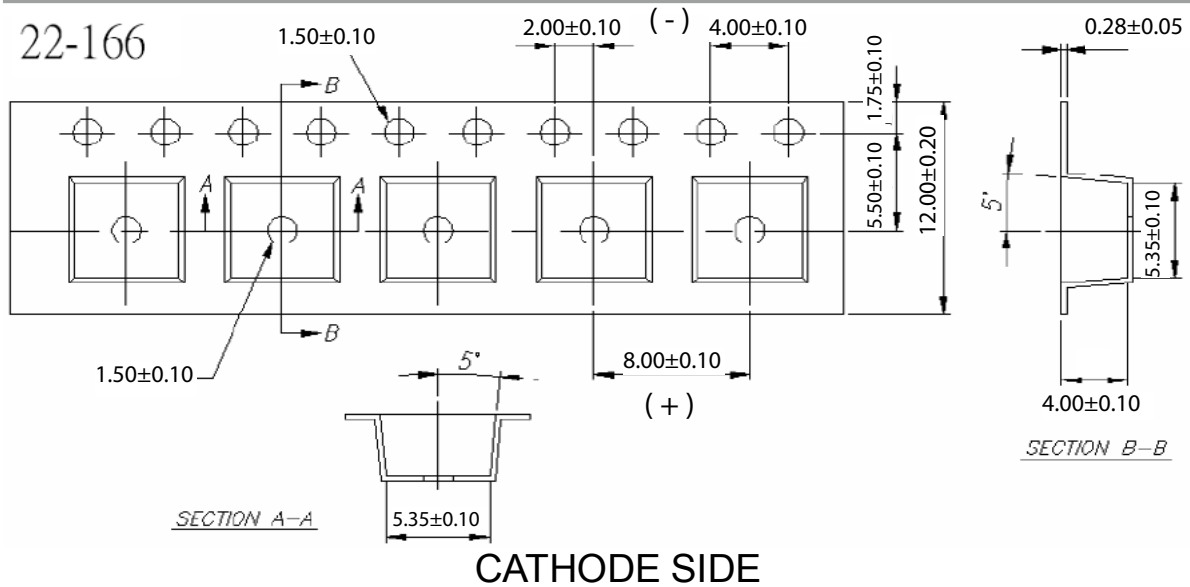
Classification Reflow Profiles

| Profile Feature | Pb-Free Assembly |
|---|------------------------------------|
| Preheat & Soak Temperature min (T _{sm}) Temperature max (T _{sm}) Time (T _{sm} to T _{sm}) (ts) | 150 °C 200 °C 60-120 seconds |
| Average ramp-up rate (T _{sm} 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 _{sm}) | 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



| Item | Quantity | Total | Dimensions(mm) |
|--------|----------|-----------|----------------|
| Reel | 500pcs | 500pcs | R-178 |
| Box | 4 Reels | 2,000pcs | 240*235*67 |
| Carton | 5 boxes | 10,000pcs | 353*354*256 |

Starting with 50pcs empty, and 50pcs empty at the last

Revision History

| Versions | Description | Release Date |
|----------|-------------|--------------|
| 0.1 | Preliminary | 2019/10/23 |

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

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