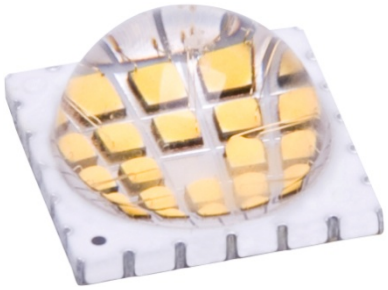
# LZP-Series

Highest Lumen Density
Cool White Emitter

# LZP-00CW00



## Key Features

- Highest luminous flux / area single LED emitter
  - 4600lm Cool White
  - 40mm² light emitting area
- Compact 12.0mm x 12.0mm x 6.7mm package
- Unique power package design allows emitter to be driven reliably at 1000mA/die, 90W
- Industry leading lumen maintenance
- Color Point Stability 7x improvement over Energy Star requirements
- Surface mount ceramic package with integrated glass lens
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on copper core MCPCB
- Custom TIR lens family (LLxx-3T11) specifically designed for LZP-series LEDs

## Typical Applications

- High Bay and Low Bay
- General lighting
- Stage and Studio lighting
- Architectural lighting
- Street lighting

## Description

The LZP-00CW00 Cool White LED emitter can dissipate up to 90W of power in an extremely small package. With a small 12.0mm x 12.0mm x 6.7mm footprint, this package provides unmatched luminous flux density. LedEngin's patent-pending thermally insulated phosphor layer provides spatial color uniformity across the radiation pattern and a consistent CCT, CRI over time and temperature. The high quality materials used in the package are chosen to optimize light output and minimize stresses which results in superior reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

# Part number options

## Base part number

| Part number | Description |
|---|---|
| LZP-00CW00-xxxx | LZP emitter |
| LZP-D0CW00-xxxx | LZP emitter on 5 channel 4x6+1 Star MCPCB |
| LZP-G0CW00-xxxx | LZP emitter on 2 channel 2x12+1 Connectorized MCPCB |
| LZP-H0CW00-xxxx | LZP emitter on 2 channel 4x6+1 Connectorized MCPCB |

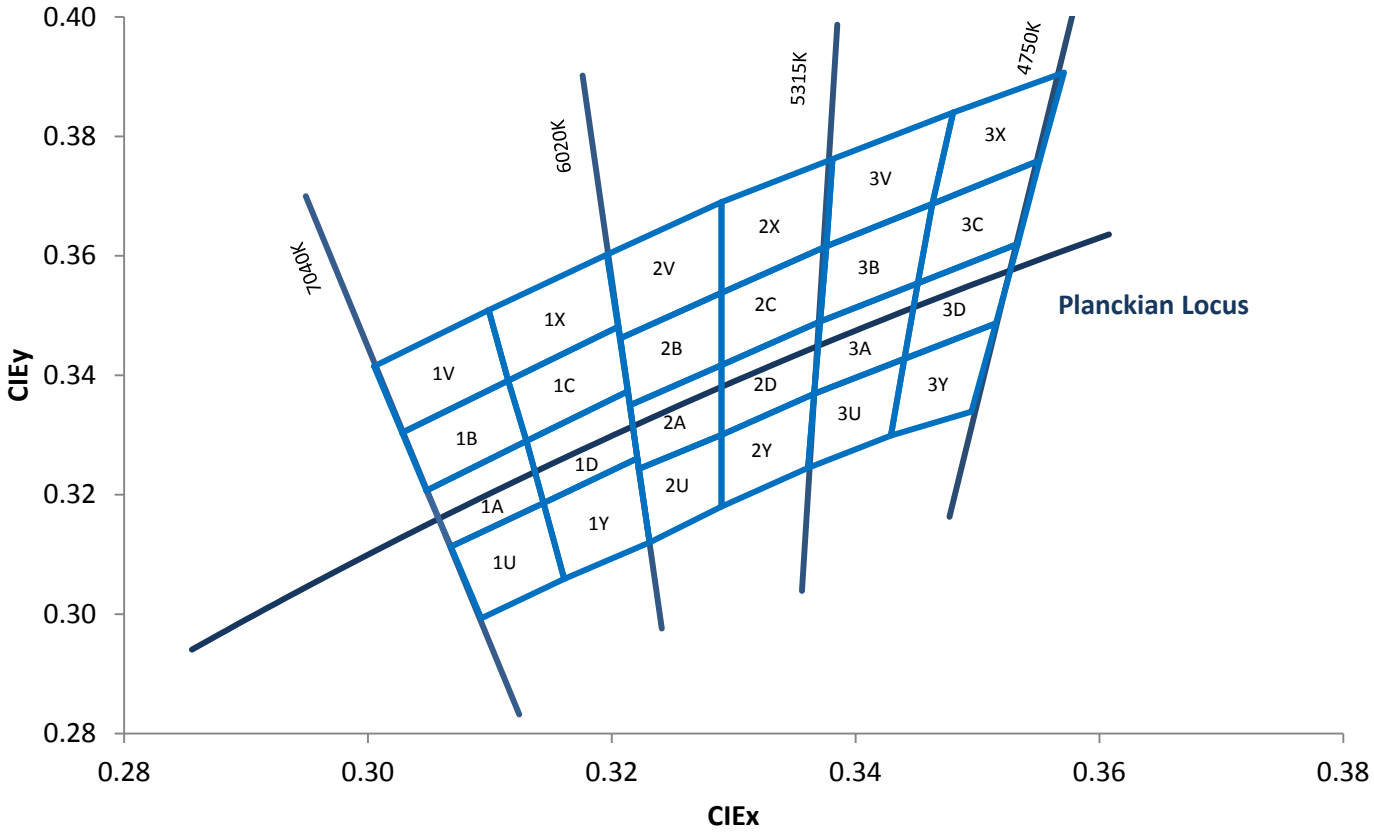
Notes:
1. See “Part Number Nomenclature” for full overview on LED Engin part number nomenclature.

## Bin kit option codes:

| CW, Cool White (5000K – 6500K) | | | |
|---|---|---|---|
| **Kit number suffix** | **Min flux Bin** | **Chromaticity bins** | **Description** |
| 0000 | G | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | full distribution flux; full distribution CCT |
| H000 | H | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | H= minimum flux bin; full distribution CCT |
| 0050 | G | 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | full distribution flux; 5000K bin |
| H050 | H | 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | H=minimum flux bin; 5000K bin |
| 0053 | G | 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | full distribution flux; 5300K bin |
| H053 | H | 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X, 3U, 3A, 3B, 3V, 3Y, 3D, 3C, 3X | H=minimum flux bin; 5300K bin |
| 0055 | G | 2U, 2Y, 3U, 2A, 2D, 3A, 2B, 2C, 3B, 2V, 2X, 3V | full distribution flux; 5500K bin |
| H055 | H | 2U, 2Y, 3U, 2A, 2D, 3A, 2B, 2C, 3B, 2V, 2X, 3V | H=minimum flux bin; 5500K bin |
| 0056 | G | 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X | full distribution flux; 5600K bin |
| H056 | H | 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X | H=minimum flux bin; 5600K bin |
| 0060 | G | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X | full distribution flux; 6000K bin |
| H060 | H | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V, 2Y, 2D, 2C, 2X | H=minimum flux bin; 6000K bin |
| 0065 | G | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V | full distribution flux; 6500K bin |
| H065 | H | 1U, 1A, 1B, 1V, 1Y, 1D, 1C, 1X, 2U, 2A, 2B, 2V | H=minimum flux bin; 6500K bin |

Notes:
1. Default bin kit option is -0000

## Cool White Chromaticity Groups




Standard Chromaticity Groups plotted on excerpt from the CIE 1931 (2°) x-y Chromaticity Diagram.
Coordinates are listed below in the table.

# Cool White Bin Coordinates

| Bin code | CIEx | CIEy | Bin code | CIEx | CIEy | Bin code | CIEx | CIEy | Bin code | CIEx | CIEy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.3068 | 0.3113 | | 0.3048 | 0.3207 | | 0.3028 | 0.3304 | | 0.3005 | 0.3415 |
| | 0.3144 | 0.3186 | | 0.313 | 0.329 | | 0.3115 | 0.3391 | | 0.3099 | 0.3509 |
| 1U | 0.3161 | 0.3059 | 1A | 0.3144 | 0.3186 | 1B | 0.313 | 0.329 | 1V | 0.3115 | 0.3391 |
| | 0.3093 | 0.2993 | | 0.3068 | 0.3113 | | 0.3048 | 0.3207 | | 0.3028 | 0.3304 |
| | 0.3068 | 0.3113 | | 0.3048 | 0.3207 | | 0.3028 | 0.3304 | | 0.3005 | 0.3415 |
| | 0.3144 | 0.3186 | | 0.313 | 0.329 | | 0.3115 | 0.3391 | | 0.3099 | 0.3509 |
| | 0.3221 | 0.3261 | | 0.3213 | 0.3373 | | 0.3205 | 0.3481 | | 0.3196 | 0.3602 |
| 1Y | 0.3231 | 0.312 | 1D | 0.3221 | 0.3261 | 1C | 0.3213 | 0.3373 | 1X | 0.3205 | 0.3481 |
| | 0.3161 | 0.3059 | | 0.3144 | 0.3186 | | 0.313 | 0.329 | | 0.3115 | 0.3391 |
| | 0.3144 | 0.3186 | | 0.313 | 0.329 | | 0.3115 | 0.3391 | | 0.3099 | 0.3509 |
| | 0.3222 | 0.3243 | | 0.3215 | 0.335 | | 0.3207 | 0.3462 | | 0.3196 | 0.3602 |
| | 0.329 | 0.33 | | 0.329 | 0.3417 | | 0.329 | 0.3538 | | 0.329 | 0.369 |
| 2U | 0.329 | 0.318 | 2A | 0.329 | 0.33 | 2B | 0.329 | 0.3417 | 2V | 0.329 | 0.3538 |
| | 0.3231 | 0.312 | | 0.3222 | 0.3243 | | 0.3215 | 0.335 | | 0.3207 | 0.3462 |
| | 0.3222 | 0.3243 | | 0.3215 | 0.335 | | 0.3207 | 0.3462 | | 0.3196 | 0.3602 |
| | 0.329 | 0.33 | | 0.329 | 0.3417 | | 0.329 | 0.3538 | | 0.329 | 0.369 |
| | 0.3366 | 0.3369 | | 0.3371 | 0.349 | | 0.3376 | 0.3616 | | 0.3381 | 0.3762 |
| 2Y | 0.3361 | 0.3245 | 2D | 0.3366 | 0.3369 | 2C | 0.3371 | 0.349 | 2X | 0.3376 | 0.3616 |
| | 0.329 | 0.318 | | 0.329 | 0.33 | | 0.329 | 0.3417 | | 0.329 | 0.3538 |
| | 0.329 | 0.33 | | 0.329 | 0.3417 | | 0.329 | 0.3538 | | 0.329 | 0.369 |
| | 0.3366 | 0.3369 | | 0.3371 | 0.349 | | 0.3376 | 0.3616 | | 0.3381 | 0.3762 |
| | 0.344 | 0.3428 | | 0.3451 | 0.3554 | | 0.3463 | 0.3687 | | 0.348 | 0.384 |
| 3U | 0.3429 | 0.3299 | 3A | 0.344 | 0.3427 | 3B | 0.3451 | 0.3554 | 3V | 0.3463 | 0.3687 |
| | 0.3361 | 0.3245 | | 0.3366 | 0.3369 | | 0.3371 | 0.349 | | 0.3376 | 0.3616 |
| | 0.3366 | 0.3369 | | 0.3371 | 0.349 | | 0.3376 | 0.3616 | | 0.3381 | 0.3762 |
| | 0.344 | 0.3428 | | 0.3451 | 0.3554 | | 0.3463 | 0.3687 | | 0.348 | 0.384 |
| | 0.3515 | 0.3487 | | 0.3533 | 0.362 | | 0.3551 | 0.376 | | 0.3571 | 0.3907 |
| 3Y | 0.3495 | 0.3339 | 3D | 0.3515 | 0.3487 | 3C | 0.3533 | 0.362 | 3X | 0.3551 | 0.376 |
| | 0.3429 | 0.3299 | | 0.344 | 0.3427 | | 0.3451 | 0.3554 | | 0.3463 | 0.3687 |
| | 0.344 | 0.3428 | | 0.3451 | 0.3554 | | 0.3463 | 0.3687 | | 0.348 | 0.384 |

## Luminous Flux Bins

Table 1:

| Bin Code | Minimum Luminous Flux ($\Phi_V$) @ $I_F$ = 700mA /Channel [1,2] (lm) | Maximum Luminous Flux ($\Phi_V$) @ $I_F$ = 700mA /Channel [1,2] (lm) |
|---|---|---|
| G2 | 3,200 | 3,500 |
| H2 | 3,500 | 3,800 |
| J2 | 3,800 | 4,200 |

Notes for Table 1:

1. Luminous flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of ± 10% on flux measurements.
2. Luminous Flux typical value is for all 24 LED dies operating at rated current. The LED is configured with 4 Channels of 6 dies in series.

## Forward Voltage Bin

Table 2:

| Bin Code | Minimum Forward Voltage ($V_F$) @ $I_F$ = 700mA /Channel [1] (V) | Maximum Forward Voltage ($V_F$) @ $I_F$ = 700mA /Channel [1] (V) |
|---|---|---|
| 0 | 19.20[2,3] | 23.52[2,3] |

Notes for Table 2:

1. LedEngin maintains a tolerance of ± 0.24V for forward voltage measurements.
2. All 4 white Channels have matched Vf for parallel operation
3. Forward Voltage is binned with 6 LED dies connected in series. The LED is configured with 4 Channels of 6 dies in series each.

## IPC/JEDEC Moisture Sensitivity Level

Table 4 - IPC/JEDEC J-STD-20D.1 MSL Classification:

| | | | Soak Requirements | | | |
|---|---|---|---|---|---|---|
| | Floor Life | | Standard | | Accelerated | |
| **Level** | Time | Conditions | Time (hrs) | Conditions | Time (hrs) | Conditions |
| 1 | unlimited | ≤ 30°C/ 85% RH | 168 +5/-0 | 85°C/ 85% RH | n/a | n/a |

Notes for Table 4:

1. The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.

## Average Lumen Maintenance Projections

Lumen maintenance generally describes the ability of a lamp to retain its output over time. The useful lifetime for solid state lighting devices (Power LEDs) is also defined as Lumen Maintenance, with the percentage of the original light output remaining at a defined time period. L70 defines the amount of operating hours at which the light output has reached 70% of its original output.

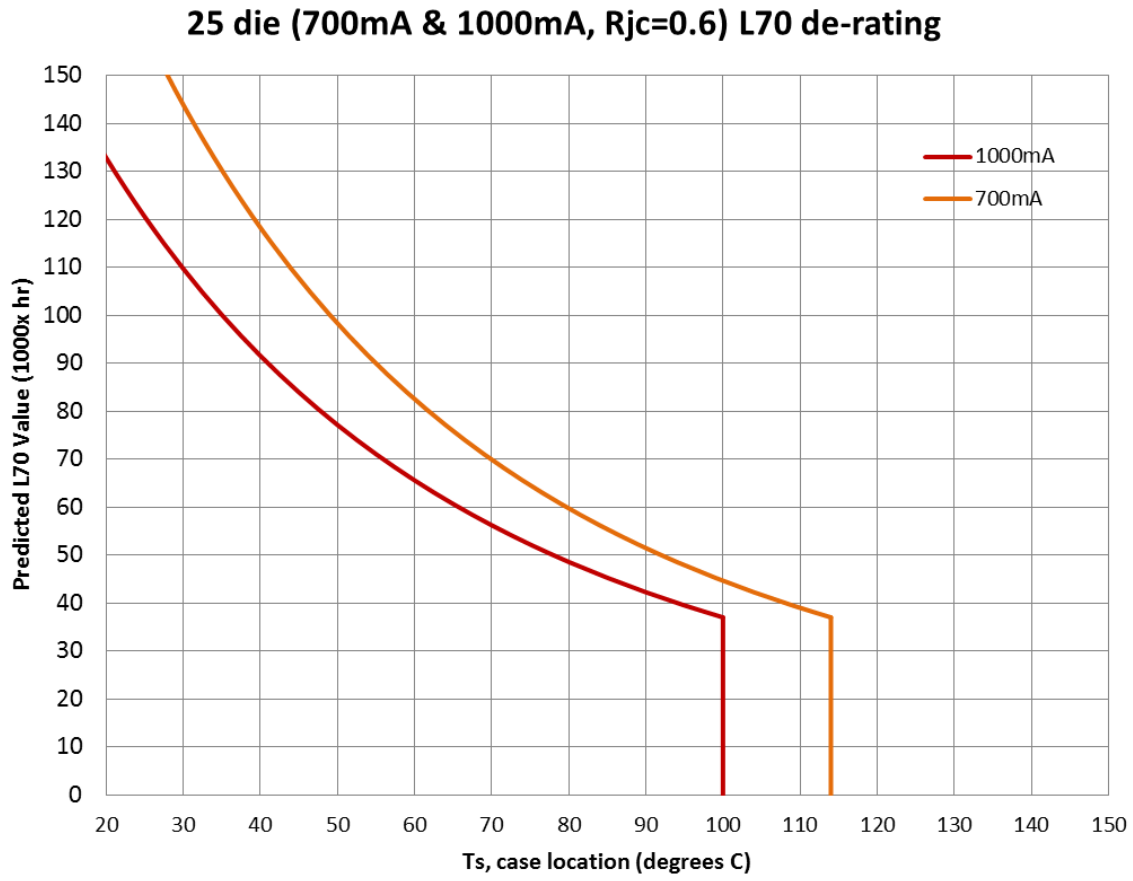



Figure 1: De-rating curve for operation of all dies at 700mA

Notes for Table 4:

1. Ts is a thermal reference point. See for detail Figure 3.

## Typical Radiation Pattern

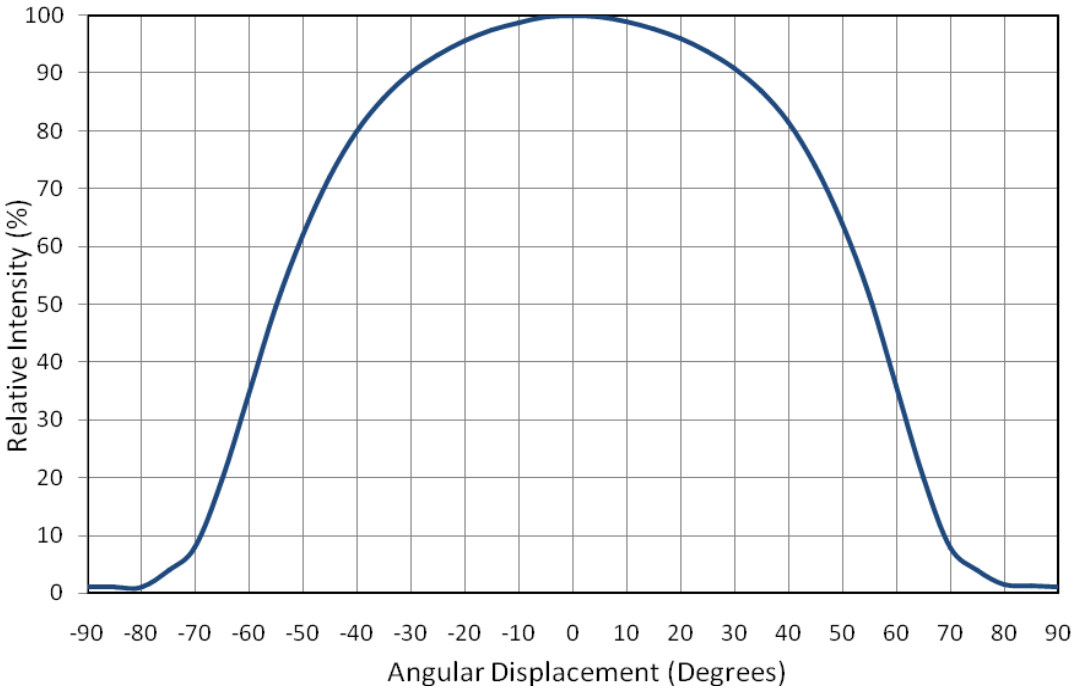



Figure 2: Typical representative spatial radiation pattern.

## Color over Angle Pattern

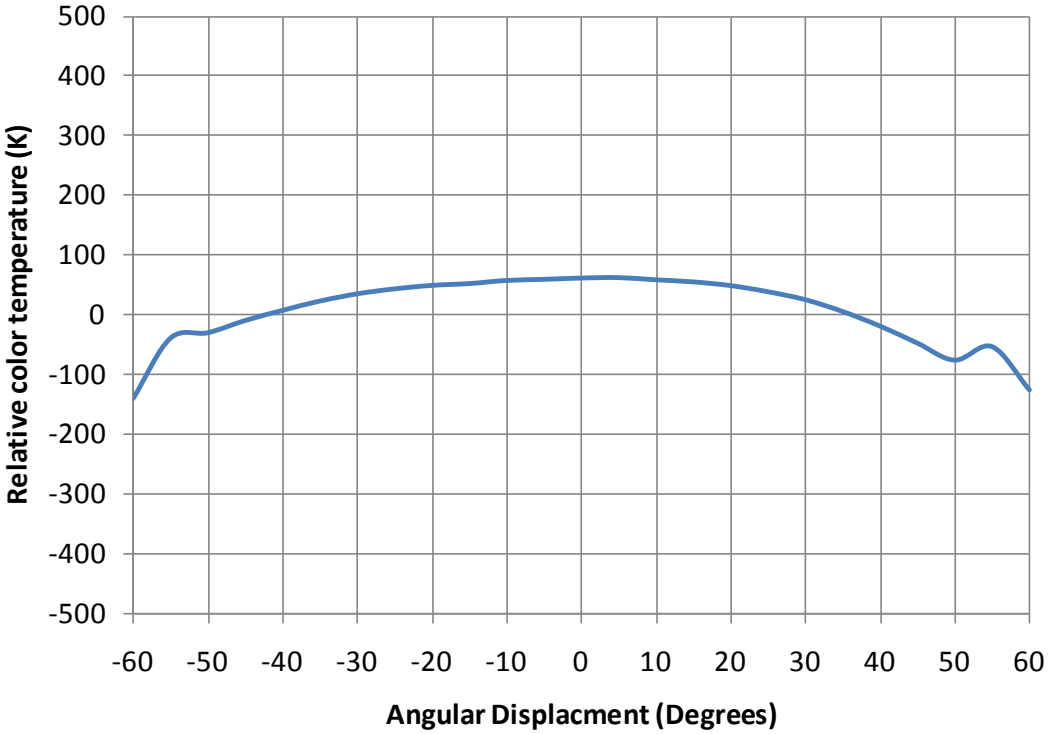



Figure 2: Typical representative color over angle pattern (includes 95% of the luminous flux).

## Absolute Maximum Ratings

Table 5:

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| DC Forward Current at $T_{jmax}$=135°C [1] | $I_F$ | 1200 | mA |
| DC Forward Current at $T_{jmax}$=150°C [1] | $I_F$ | 1000 | mA |
| Peak Pulsed Forward Current [2] | $I_{FP}$ | 1500 /Channel | mA |
| Reverse Voltage | $V_R$ | See Note 3 | V |
| Storage Temperature | $T_{stg}$ | -40 ~ +150 | °C |
| Junction Temperature | $T_J$ | 150 | °C |
| Soldering Temperature [4] | $T_{sol}$ | 260 | °C |
| Allowable Reflow Cycles | | 6 | |
| ESD Sensitivity [5] | | > 8,000 V HBM<br>Class 3B JESD22-A114-D | |

Notes for Table 5:
1. Maximum DC forward current (per die) is determined by the overall thermal resistance and ambient temperature. Follow the curves in Figure 10 for current de-rating.
2: Pulse forward current conditions: Pulse Width ≤ 10msec and Duty cycle ≤ 10%.
3. LEDs are not designed to be reverse biased.
4. Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 5.
5. LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZP-00CW00 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

## Optical Characteristics @ $T_C$ = 25°C

Table 6:

| Parameter | Symbol | Typical | Unit |
|---|---|---|---|
| Luminous Flux (@ $I_F$ = 700mA) [1] | $\Phi_V$ | 3600 | lm |
| Luminous Flux (@ $I_F$ = 1000mA) [1] | $\Phi_V$ | 4600 | lm |
| Luminous Efficacy (@ $I_F$ = 350mA) | | 80 | lm/W |
| Correlated Color Temperature | CCT | 5500 | K |
| Chromaticity Coordinates | x,y | 0.332, 0.341 | |
| Color Rendering Index (CRI) | $R_a$ | 75 | |
| Viewing Angle [2] | $2\Theta_{1/2}$ | 110 | Degrees |

Notes for Table 6:
1. Luminous flux typical value is for all 24 LED dies operating at rated current.
2. Viewing Angle is the off-axis angle from emitter centerline where the luminous intensity is ½ of the peak value.

## Electrical Characteristics @ $T_C$ = 25°C

Table 7:

| Parameter | Symbol | Typical | Unit |
|---|---|---|---|
| Forward Voltage (@ $I_F$ = 700mA) [1] | $V_F$ | 21.0 /Channel | V |
| Forward Voltage (@ $I_F$ = 1000mA) [1] | $V_F$ | 21.9 /Channel | V |
| Temperature Coefficient of Forward Voltage [1] | $\Delta V_F/\Delta T_J$ | -33.6 | mV/°C |
| Thermal Resistance (Junction to Case) | $R\Theta_{J-C}$ | 0.6 | °C/W |

Notes for Table 7:
1. Forward Voltage is measured for a single string of 6 dies connected in series. The LED is configured with 4 Channels of 6 dies in series each.

## Mechanical Dimensions (mm)

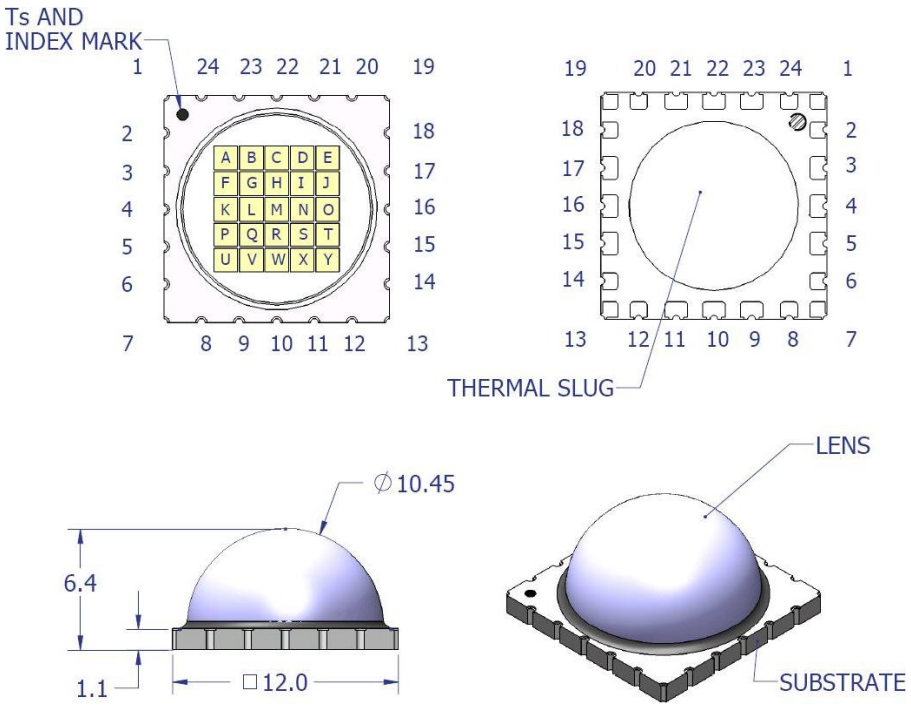
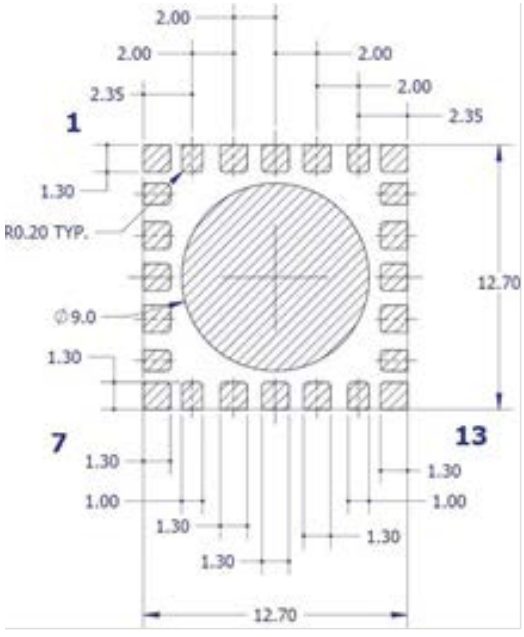



Figure 3: Package outline drawing.

Notes for Figure 3:
2. Unless otherwise noted, the tolerance = ± 0.20 mm.
3. Thermal slug is electrically isolated
4. Ts is a thermal reference point

| Pin Out | | | | |
|---|---|---|---|---|
| **Ch.** | **Pad** | **Die** | **Color** | **Function** |
| 1 | 18 | E | CW | Anode |
| | | D | CW | na |
| | | C | CW | na |
| | | B | CW | na |
| | | A | CW | na |
| | 24 | F | CW | Cathode |
| 2 | 17 | J | CW | Anode |
| | | I | CW | na |
| | | H | CW | na |
| | | G | CW | na |
| | | L | CW | na |
| | 3 | K | CW | Cathode |
| 3 | 15 | O | CW | Anode |
| | | N | CW | na |
| | | S | CW | na |
| | | R | CW | na |
| | | Q | CW | na |
| | 5 | P | CW | Cathode |
| 4 | 14 | T | CW | Anode |
| | | Y | CW | na |
| | | X | CW | na |
| | | W | CW | na |
| | | V | CW | na |
| | 8 | U | CW | Cathode |
| 5 | 2 | M | - | na |
| | 23 | M | - | na |

## Recommended Solder Pad Layout (mm)



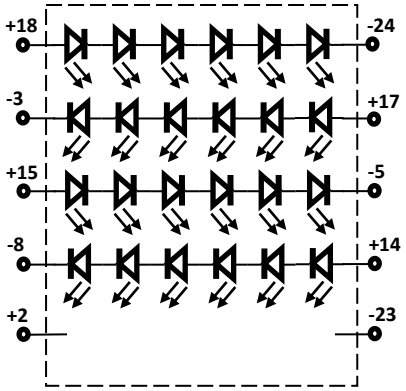




Figure 4: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 4:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.

## Reflow Soldering Profile

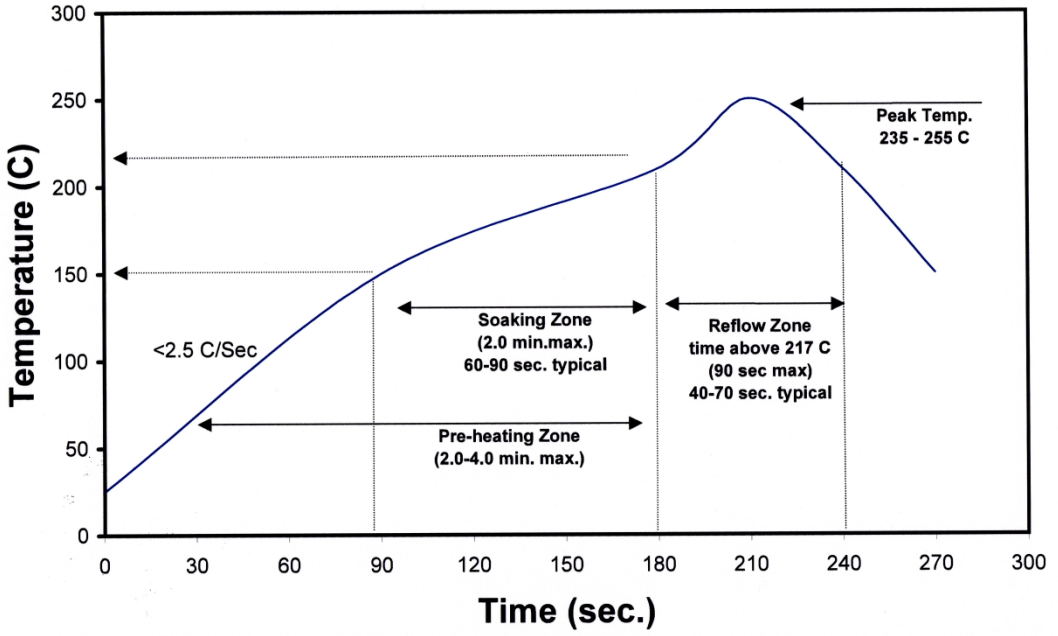



Figure 5: Reflow soldering profile for lead free soldering.

## Typical Relative Spectral Power Distribution

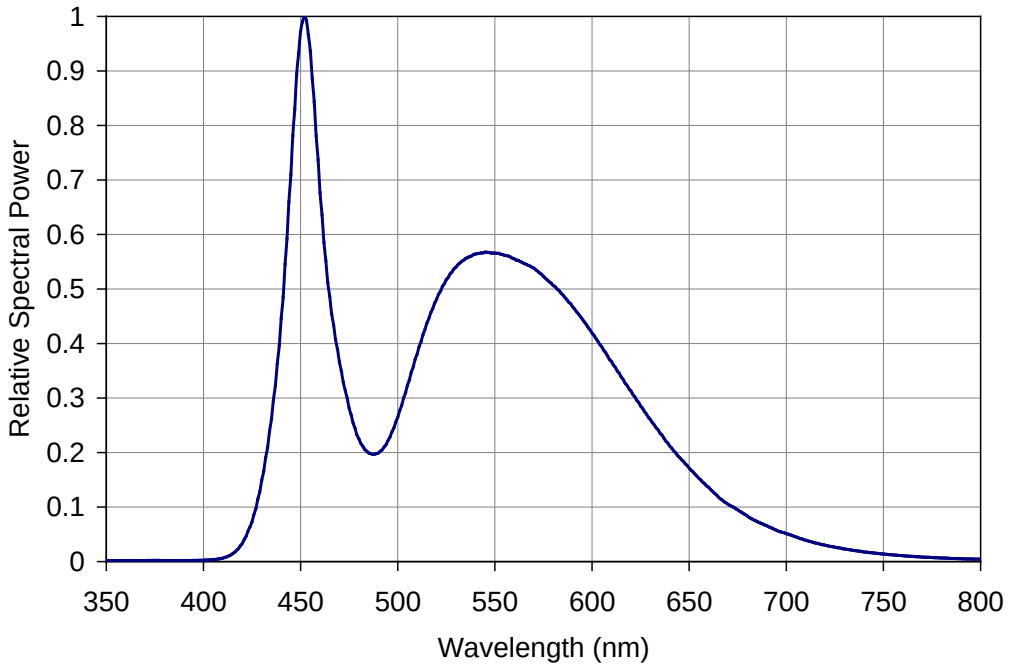



Figure 6: Typical relative spectral power vs. wavelength @ $T_C$ = 25°C.

## Typical Relative Light Output

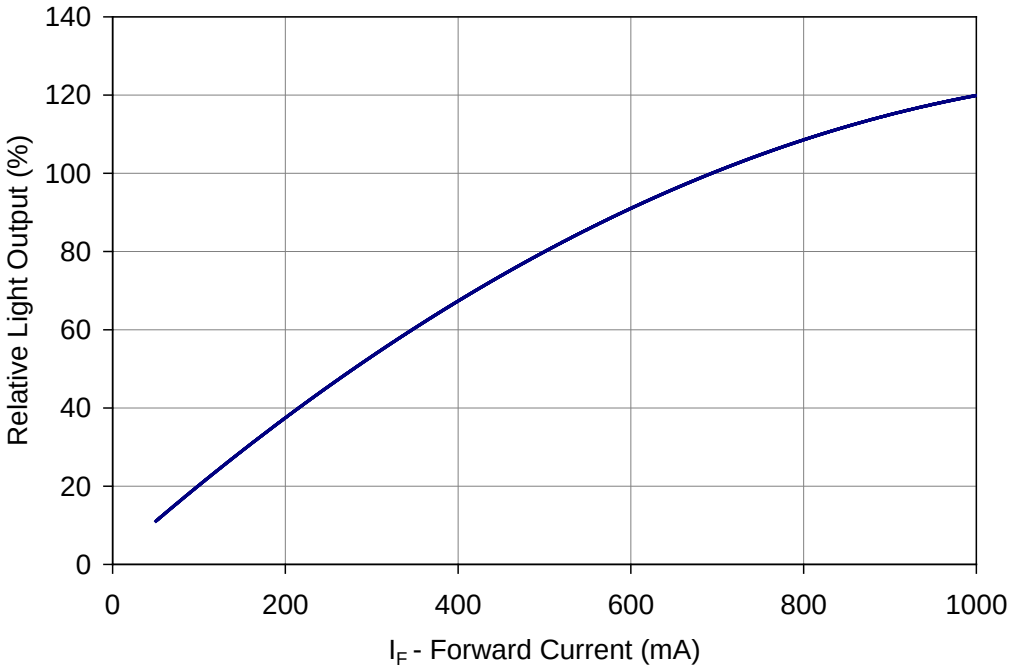



Figure 7: Typical relative light output vs. forward current @ $T_C$ = 25°C.

Notes for Figure 7:

1. Luminous Flux typical value is for all 24 LED dies operating concurrently at rated current pro Channel.

## Typical Relative Light Output over Temperature

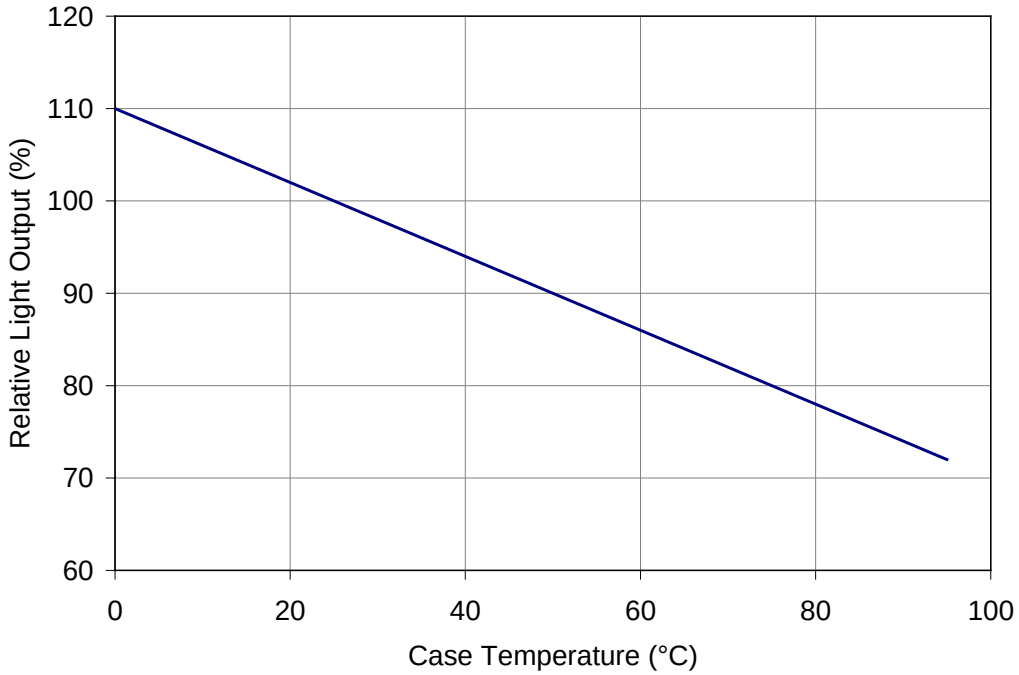



Figure 8: Typical relative light output vs. case temperature.

Notes for Figure 8:

1. Luminous Flux typical value is for all 24 LED dies operating concurrently at rated current pro Channel.

## Typical Forward Current Characteristics

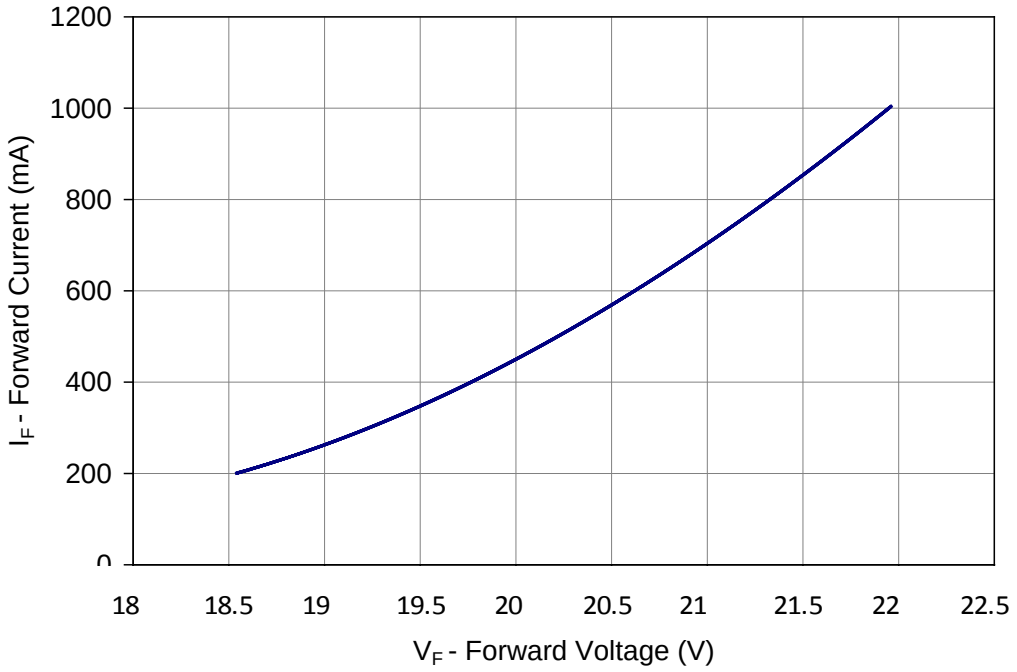



Figure 9: Typical forward current vs. forward voltage @ $T_C$ = at 25°C.

Note for Figure 9:

1. Forward Voltage is measured for a single string of 6 dies connected in series. The LED is configured with 4 Channels of 6 dies in series each.

## Current De-rating

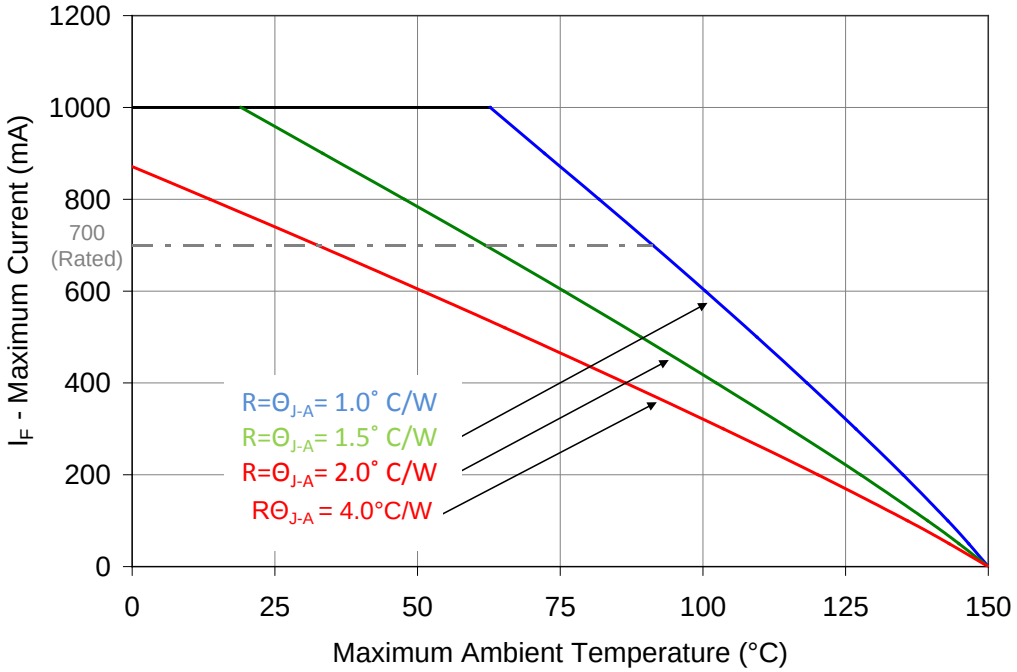



Figure 10: Maximum forward current vs. ambient temperature based on $T_{J(MAX)}$ = 150°C.

Notes for Figure 10:

1. Maximum current assumes that all LED dies are operating at rated current.
2. RΘ$_{J-C}$ [Junction to Case Thermal Resistance] for the LZP-series is typically 0.6°C/W.
3. RΘ$_{J-A}$ [Junction to Ambient Thermal Resistance] = RΘ$_{J-C}$ + RΘ$_{C-A}$ [Case to Ambient Thermal Resistance].

## Part-number Nomenclature

The LZ Series base part number designation is defined as follows:

L Z A – B C D E F G – H I J K

A – designates the number of LED die in the package

- 1 for single die emitter package
- 4 for 4-die emitter package
- C for 12-die emitter package
- P for 25-die emitter package

B – designates the package level

- 0 for Emitter only
- Other letters indicate the addition of a MCPCB. See appendix “MCPCB options” for details

C – designates the radiation pattern

- 0 for Clear domed lens (Lambertian radiation pattern)
- 1 for Flat-top
- 3 for Frosted domed lens

D and E – designates the color

- U6 Ultra Violet (365nm)
- UA Violet (400nm)
- DB Dental Blue (460nm)
- B2 Blue (465nm)
- G1 Green (525nm)
- A1 Amber (590nm)
- R1 Red (623nm)
- R2 Deep Red (660nm)
- R3 Far Red (740nm)
- WW Warm White (3100K)
- NW Neutral White (4100K)
- CW Cool White (5500K)
- W2 Warm & Cool White mixed dies
- MC RGB
- MA RGBA
- MD RGBW (6500K)

F and G – designates the package options if applicable

- See “Base part number” on page 2 for details. Default is “00”

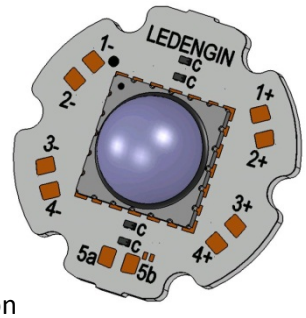
H, I, J, K – designates kit options

- See “Bin kit options” on page 2 for details. Default is “0000”

Ordering information:
For ordering LedEngin products, please reference the base part number above. The base part number represents our standard full distribution flux and wavelength range. Other standard bin combinations can be found on page 2. For ordering products with custom bin selections, please contact a LedEngin sales representative or authorized distributor.

## LZP Emitter on
## 5 channel star MCPCB

# LZP-Dxxxxx




### Key Features

- Supports 6 LED dies in series 4 times and the optional center die location
- Very low thermal Resistance for MCPCB adds only 0.1°C/W
- Multiple mounting and attachment options
- 5-channel configuration for modular driver control
- MCPCB contains Zener Diode for ESD protection
- LED Engin LZP Lens family (15 to 32deg) aligns with the MCPCB cutouts
- 28.3mm diameter star MCPCB

### Description

The LZP-Dxxxxx 4 channel MCPCB option provides a convenient method to mount LED Engin's LZP emitters. The six recessed features allow the use of M3 or #4-40 screws to attach the MCPCB to a heat sink. The MCPCB has three sets of "+" (Anode) and "-" (Cathode) solder pads for electrical connections.

### $R\Theta_{J-B}$ Lookup Table

| Product | Emitter $\Theta_{J-C}$ | | MCPCB $R\Theta_{C-B}$ | | Emitter + MCPCB $R\Theta_{J-B}$ |
|---|---|---|---|---|---|
| LZP-Dxxxxx | 0.6°C/W | + | 0.1°C/W | = | 0.7°C/W |

Note for Table 1:

- $R\Theta_{J-B}$ is the combined thermal resistance from the LED die junction to the copper core on MCPCB ($R\Theta_{J-C} + R\Theta_{C-B} = R\Theta_{J-B}$).

## LZP emitter on
## 2 channel (2x12 + 1) connectorized MCPCB with thermistor

# LZP-GxxxT1


## Key Features

- Supports 12 LED dies in series twice connected in parallel and the optional center die location.
- Very low thermal Resistance for MCPCB adds only 0.1°C/W
- Multiple mounting and attachment options
- 1-channel configuration for 2x12 allows for easy driver control
- MCPCB contains Zener Diodes for ESD protection
- LED Engin LZP Lens family (15 to 32deg) aligns with the MCPCB cutouts
- Two poke-home/in connectors mounted on the MCPCB for easy connections
- One poke-home/in connector for the on board thermistor
- 49.9mm diameter star MCPCB

## Description

The LZP-Gxxxxx, 2 channels MCPCB with three 2-pin poke-in connectors to provides a convenient method to utilize LED Engin's LZP single color emitters. One 2 pin poke-in connector is for connecting all of the 2x12 dies, one is for the center die, and one is for connecting the thermistor. The four recessed features allow the use of M3 or #4-40 screws to attach the MCPCB to a heat sink. The MCPCB also contains zener diodes for enhanced ESD protection.

## $R\Theta_{J-B}$ Lookup Table

| **Product** | **Emitter $\Theta_{J-C}$** | | **MCPCB $R\Theta_{C-B}$** | | **Emitter + MCPCB $R\Theta_{J-B}$** |
|---|---|---|---|---|---|
| LZP-Gxxxxx | 0.6°C/W | + | 0.1°C/W | = | 0.7°C/W |

- $R\Theta_{J-B}$ is the combined thermal resistance from the LED die junction to the copper core on MCPCB ($R\Theta_{J-C} + R\Theta_{C-B} = R\Theta_{J-B}$).

## LZP emitter on
## 2 channel poke-in MCPCB (4x6 + 1) with thermistor

# LZP-HxxxT1


## Key Features

- Supports 6 LED dies in series 4 times, all connected in parallel and the optional center die location.
- Very low thermal Resistance for MCPCB adds only 0.1°C/W
- Multiple mounting and attachment options
- 1-channel configuration for 4x6 allows for easy driver control
- MCPCB contains Zener Diodes for ESD protection
- LED Engin LZP Lens family (15 to 32deg) aligns with the MCPCB cutouts
- Two poke-home/in connectors already mounted on the MCPCB for easy connections
- One poke-home/in connector for the on board thermistor
- 49.9mm diameter star MCPCB

## Description

The LZP-Hxxxxx, 2 channels MCPCB with three 2-pin poke-in connectors to provides a convenient method to utilize LED Engin's LZP emitters. One 2 pin poke-in connector is for connecting all of the 4x6 dies, one is for the center die, and one is for connecting the thermistor. The four recessed features allow the use of M3 or #4-40 screws to attach the MCPCB to a heat sink. The MCPCB also contains zener diodes for enhanced ESD protection.

## $R\Theta_{J-B}$ Lookup Table

| **Product** | **Emitter $\Theta_{J-C}$** | | **MCPCB $R\Theta_{C-B}$** | | **Emitter + MCPCB $R\Theta_{J-B}$** |
|---|---|---|---|---|---|
| LZP-Hxxxxx | 0.6°C/W | + | 0.1°C/W | = | 0.7°C/W |

- $R\Theta_{J-B}$ is the combined thermal resistance from the LED die junction to the copper core on MCPCB ($R\Theta_{J-C} + R\Theta_{C-B} = R\Theta_{J-B}$).

## Lens Options – LLxx-xT11-H

### LLSP-3T11-H

- LZP-series, 15 degrees lens with holder.
- Maximizes "Lux on Target" [tm] performance
- Smooth light gradient eliminates hot spots and rings for superior illumination.

#### Specifications – Typical Values

| Parameter | Value |
|---|---|
| Viewing Angle (FWHM) | 15° |
| Optical Efficiency | 80% |
| Height from Seating Plane (holder) | 48.1mm |
| Maximum Width | 84.0mm |

### LLNF-3T11-H

- LZP-series, 23 degrees lens with holder.
- Maximizes "Lux on Target" [tm] performance.
- Smooth light gradient eliminates hot spots and rings for superior illumination.

#### Specifications – Typical Values

| Parameter | Value |
|---|---|
| Viewing Angle (FWHM) | 23° |
| Optical Efficiency | 80% |
| Height from Seating Plane (holder) | 25.0mm |
| Maximum Width | 47.50mm |

### LLFL-3T11-H

- LZP-series, 32 degrees lens with holder.
- Maximizes "Lux on Target" [tm] performance.
- Smooth light gradient eliminates hot spots and rings for superior illumination.

#### Specifications – Typical Values

| Parameter | Value |
|---|---|
| Viewing Angle (FWHM) | 32° |
| Optical Efficiency | 80% |
| Height from Seating Plane (holder) | 25.0mm |
| Maximum Width | 47.50mm |

## Company Information

LedEngin, Inc. is a Silicon Valley based solid-state lighting company specializing in the development and manufacturing of unprecedented high-power LED emitters, modules and replacement lamps. LedEngin's packaging technologies lead the industry with products that feature lowest thermal resistance, highest flux density and consummate reliability, enabling compact and efficient solid state lighting solutions.

LedEngin's LED emitters range from 3W to 90W with ultra-compact footprints and are available in single color products including Cool White, Neutral White, Warm White, Red, Green, Blue, Amber, Deep Red, Far Red, Dental Blue and UV as well as multi-color products with RGB, RGBA and RGBW options. LedEngin's brightest White LEDs are capable of emitting 4,600 lumens.

LedEngin's robust emitters are at the core of its unique line of modules and replacement lamps producing unmatched beam quality resulting in true Lux on Target™ for a wide variety of spot and narrow flood directional lighting applications.

LedEngin is committed to providing products that conserve natural resources and reduce greenhouse emissions.

LedEngin reserves the right to make changes to improve performance without notice.

Please contact Sales@ledengin.com or (408) 492-0620 for more information.