

## LZP-Series

Highest Lumen Density

Warm White Emitter

# LZP-00WW00



### Key Features

- Highest luminous flux / area single LED emitter
  - 3200lm Warm White
  - 40mm<sup>2</sup> 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
- High CRI performance for true color rendering
- 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
- Complementary 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-00WW00 Warm 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-00WW00-xxxx	LZP emitter
LZP-D0WW00-xxxx	LZP emitter on 5 channel 4x6+1 Star MCPCB
LZP-G0WW00-xxxx	LZP emitter on 2 channel 2x12+1 Connectorized MCPCB
LZP-H0WW00-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.

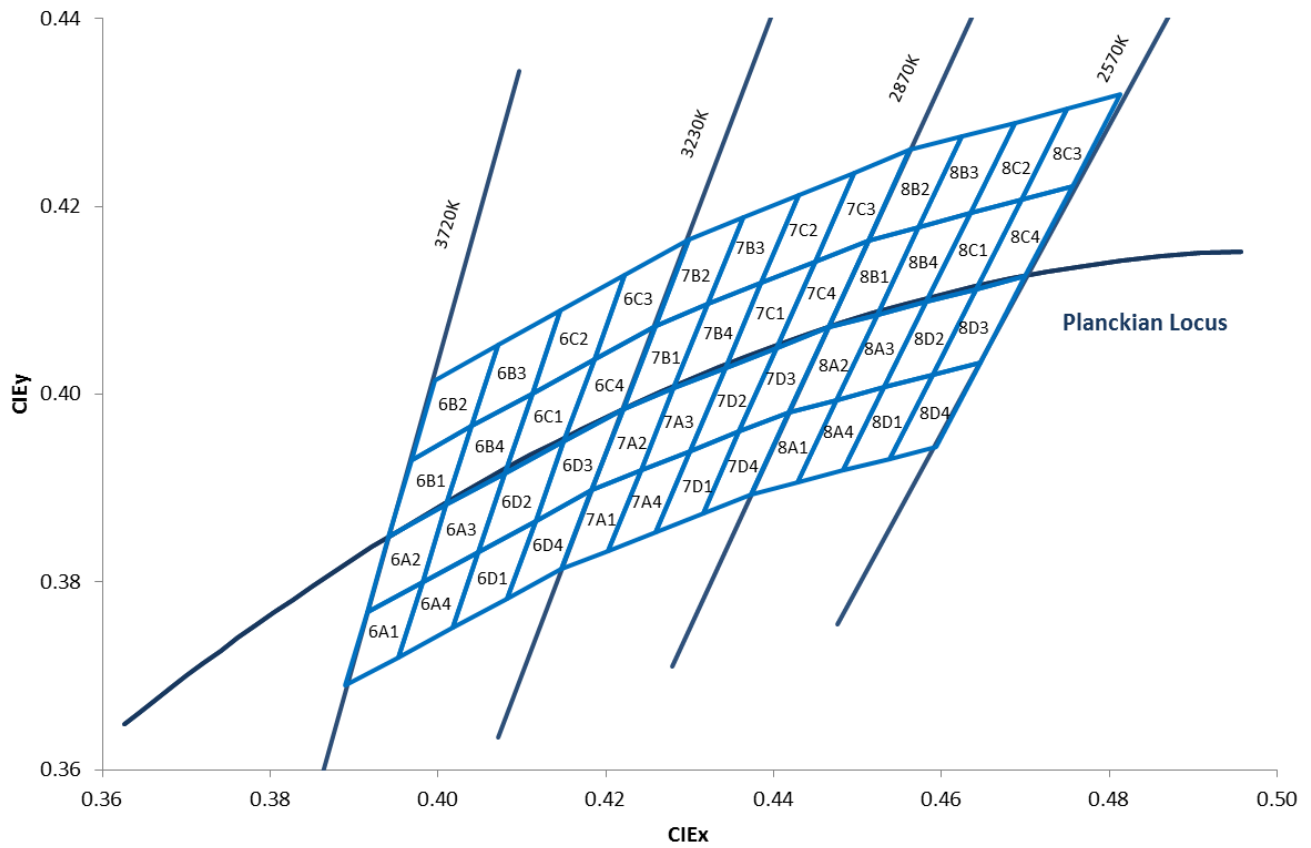
**Bin kit option codes:**

<b>WW, Warm-White (2700K – 3500K)</b>			
<b>Kit number suffix</b>	<b>Min flux Bin</b>	<b>Color Bin Ranges</b>	<b>Description</b>
0000	C2	6A1, 6A2, 6B1, 6B2, 6A4, 6A3, 6B4, 6B3, 6D1, 6D2, 6C1, 6C2, 6D4, 6D3, 6C4, 6C3, 7A1, 7A2, 7B1, 7B2, 7A4, 7A3, 7B4, 7B3, 7D1, 7D2, 7C1, 7C2, 7D4, 7D3, 7C4, 7C3, 8A1, 8A2, 8B1, 8B2, 8A4, 8A3, 8B4, 8B3, 8D1, 8D2, 8C1, 8C2, 8D4, 8D3, 8C4, 8C3	full distribution flux; full distribution CCT
D000	D2	6A1, 6A2, 6B1, 6B2, 6A4, 6A3, 6B4, 6B3, 6D1, 6D2, 6C1, 6C2, 6D4, 6D3, 6C4, 6C3, 7A1, 7A2, 7B1, 7B2, 7A4, 7A3, 7B4, 7B3, 7D1, 7D2, 7C1, 7C2, 7D4, 7D3, 7C4, 7C3, 8A1, 8A2, 8B1, 8B2, 8A4, 8A3, 8B4, 8B3, 8D1, 8D2, 8C1, 8C2, 8D4, 8D3, 8C4, 8C3	D2 minimum flux bin; full distribution CCT
0027	C2	8A1, 8A2, 8B1, 8B2, 8A4, 8A3, 8B4, 8B3, 8D1, 8D2, 8C1, 8C2, 8D4, 8D3, 8C4, 8C3	full distribution flux; 2700K ANSI CCT bin
D027	D2	8A1, 8A2, 8B1, 8B2, 8A4, 8A3, 8B4, 8B3, 8D1, 8D2, 8C1, 8C2, 8D4, 8D3, 8C4, 8C3	D2 minimum flux bin; 2700K ANSI CCT bin
0227	C2	8A2, 8B1, 8A3, 8B4, 8D2, 8C1, 8D3, 8C4	full distribution flux; 2700K ANSI CCT half bin
D227	D2	8A2, 8B1, 8A3, 8B4, 8D2, 8C1, 8D3, 8C4	D2 min flux bin; 2700K ANSI CCT half bin
0427	C2	8A3, 8B4, 8D2, 8C1	full distribution flux; 2700K ANSI CCT quarter bin
D427	D2	8A3, 8B4, 8D2, 8C1	D2 min flux bin; 2700K ANSI CCT quarter bin
0030	C2	7A1, 7A2, 7B1, 7B2, 7A4, 7A3, 7B4, 7B3, 7D1, 7D2, 7C1, 7C2, 7D4, 7D3, 7C4, 7C3	full distribution flux; 3000K ANSI CCT bin
D030	D2	7A1, 7A2, 7B1, 7B2, 7A4, 7A3, 7B4, 7B3, 7D1, 7D2, 7C1, 7C2, 7D4, 7D3, 7C4, 7C3	D2 min flux bin; 3000K ANSI CCT bin
0230	C2	7A2, 7B1, 7A3, 7B4, 7D2, 7C1, 7D3, 7C4	full distribution flux; 3000K ANSI CCT half bin
D230	D2	7A2, 7B1, 7A3, 7B4, 7D2, 7C1, 7D3, 7C4	D2 min flux bin; 3000K ANSI CCT half bin
0430	C2	7A3, 7B4, 7D2, 7C1	full distribution flux; 3000K ANSI CCT quarter bin
D430	D2	7A3, 7B4, 7D2, 7C1	D2 min flux bin; 3000K ANSI CCT quarter bin
0035	C2	6A1, 6A2, 6B1, 6B2, 6A4, 6A3, 6B4, 6B3, 6D1, 6D2, 6C1, 6C2, 6D4, 6D3, 6C4, 6C3	full distribution flux; 3500K ANSI CCT bin
D035	D2	6A1, 6A2, 6B1, 6B2, 6A4, 6A3, 6B4, 6B3, 6D1, 6D2, 6C1, 6C2, 6D4, 6D3, 6C4, 6C3	D2 min flux bin; 3500K ANSI CCT bin
0235	C2	6A2, 6B1, 6A3, 6B4, 6D2, 6C1, 6D3, 6C4	full distribution flux; 3500K ANSI CCT half bin
D235	D2	6A2, 6B1, 6A3, 6B4, 6D2, 6C1, 6D3, 6C4	D2 min flux bin; 3500K ANSI CCT half bin
0435	C2	6A3, 6B4, 6D2, 6C1	full distribution flux; 3500K ANSI CCT quarter bin
D435	D2	6A3, 6B4, 6D2, 6C1	D2 min flux bin; 3500K ANSI CCT quarter bin

**Notes:**

1. Default bin kit option is -0000

# Warm 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.

## Warm White Bin Coordinates

Bin code	CIE <sub>x</sub>	CIE <sub>y</sub>	Bin code	CIE <sub>x</sub>	CIE <sub>y</sub>	Bin code	CIE <sub>x</sub>	CIE <sub>y</sub>	Bin code	CIE <sub>x</sub>	CIE <sub>y</sub>
6A1	0.3889	0.369	6A2	0.3915	0.3768	6B1	0.3941	0.3848	6B2	0.3968	0.393
	0.3915	0.3768		0.3941	0.3848		0.3968	0.393		0.3996	0.4015
	0.3981	0.38		0.401	0.3882		0.404	0.3966		0.4071	0.4052
	0.3953	0.372		0.3981	0.38		0.401	0.3882		0.404	0.3966
	0.3889	0.369		0.3915	0.3768		0.3941	0.3848		0.3968	0.393
6A4	0.3953	0.372	6A3	0.3981	0.38	6B4	0.401	0.3882	6B3	0.404	0.3966
	0.3981	0.38		0.401	0.3882		0.404	0.3966		0.4071	0.4052
	0.4048	0.3832		0.408	0.3916		0.4113	0.4001		0.4146	0.4089
	0.4017	0.3751		0.4048	0.3832		0.408	0.3916		0.4113	0.4001
6D1	0.3953	0.372	6D2	0.3981	0.38	6C1	0.401	0.3882	6C2	0.404	0.3966
	0.4017	0.3751		0.408	0.3832		0.408	0.3916		0.4113	0.4001
	0.4048	0.3832		0.408	0.3916		0.4113	0.4001		0.4146	0.4089
	0.4116	0.3865		0.415	0.395		0.4186	0.4037		0.4222	0.4127
6D4	0.4082	0.3782	6D3	0.4116	0.3865	6C4	0.415	0.395	6C3	0.4186	0.4037
	0.4116	0.3865		0.415	0.395		0.4186	0.4037		0.4222	0.4127
	0.4183	0.3898		0.4221	0.3984		0.4259	0.4073		0.4299	0.4165
	0.4147	0.3814		0.4183	0.3898		0.4221	0.3984		0.4259	0.4073
7A1	0.4082	0.3782	7A2	0.4116	0.3865	7B1	0.415	0.395	7B2	0.4186	0.4037
	0.4116	0.3865		0.415	0.395		0.4186	0.4037		0.4222	0.4127
	0.4183	0.3898		0.4221	0.3984		0.4259	0.4073		0.4299	0.4165
	0.4147	0.3814		0.4183	0.3898		0.4221	0.3984		0.4259	0.4073
7A4	0.4203	0.3833	7A3	0.4242	0.3919	7B4	0.4281	0.4006	7B3	0.4322	0.4096
	0.4242	0.3919		0.4281	0.4006		0.4322	0.4096		0.4364	0.4188
	0.43	0.3939		0.4342	0.4028		0.4385	0.4119		0.443	0.4212
	0.4259	0.3853		0.43	0.3939		0.4342	0.4028		0.4385	0.4119
7D1	0.4203	0.3833	7D2	0.4242	0.3919	7C1	0.4281	0.4006	7C2	0.4322	0.4096
	0.4242	0.3919		0.4281	0.4006		0.4322	0.4096		0.4364	0.4188
	0.43	0.3939		0.4342	0.4028		0.4385	0.4119		0.443	0.4212
	0.4259	0.3853		0.43	0.3939		0.4342	0.4028		0.4385	0.4119
7D4	0.4259	0.3853	7D3	0.43	0.3939	7C4	0.4342	0.4028	7C3	0.4385	0.4119
	0.43	0.3939		0.4342	0.4028		0.4385	0.4119		0.443	0.4212
	0.4359	0.396		0.4403	0.4049		0.4449	0.4141		0.4496	0.4236
	0.4316	0.3873		0.4359	0.396		0.4403	0.4049		0.4449	0.4141
8A1	0.4259	0.3853	8A2	0.43	0.3939	8B1	0.4342	0.4028	8B2	0.4385	0.4119
	0.43	0.3939		0.4342	0.4028		0.4385	0.4119		0.443	0.4212
	0.4359	0.396		0.4403	0.4049		0.4449	0.4141		0.4496	0.4236
	0.4316	0.3873		0.4359	0.396		0.4403	0.4049		0.4449	0.4141
8A4	0.4316	0.3873	8A3	0.4359	0.396	8B4	0.4403	0.4049	8B3	0.4449	0.4141
	0.4359	0.396		0.4403	0.4049		0.4449	0.4141		0.4496	0.4236
	0.4418	0.3981		0.4465	0.4071		0.4513	0.4164		0.4562	0.426
	0.4373	0.3893		0.4418	0.3981		0.4465	0.4071		0.4513	0.4164
8D1	0.4316	0.3873	8D2	0.4359	0.396	8C1	0.4403	0.4049	8C2	0.4449	0.4141
	0.4373	0.3893		0.4418	0.3981		0.4465	0.4071		0.4513	0.4164
	0.4418	0.3981		0.4465	0.4071		0.4513	0.4164		0.4562	0.426
	0.4475	0.3994		0.4523	0.4085		0.4573	0.4178		0.4624	0.4274
8D4	0.4428	0.3906	8D3	0.4475	0.3994	8C4	0.4523	0.4085	8C3	0.4573	0.4178
	0.4373	0.3893		0.4418	0.3981		0.4465	0.4071		0.4513	0.4164
	0.4475	0.3994		0.4523	0.4085		0.4573	0.4178		0.4624	0.4274
	0.4428	0.3906		0.4523	0.4085		0.4573	0.4178		0.4624	0.4274
8D1	0.4532	0.4008	8D2	0.4582	0.4099	8C1	0.4634	0.4193	8C2	0.4687	0.4289
	0.4483	0.3919		0.4532	0.4008		0.4582	0.4099		0.4634	0.4193
	0.4483	0.3919		0.4582	0.4099		0.4634	0.4193		0.4687	0.4289
	0.4538	0.3931		0.4641	0.4112		0.4695	0.4207		0.475	0.4304
8D4	0.4538	0.3931	8D3	0.4589	0.4021	8C4	0.4641	0.4112	8C3	0.4695	0.4207
	0.4589	0.4021		0.4641	0.4112		0.4695	0.4207		0.475	0.4304
	0.4646	0.4034		0.47	0.4126		0.4756	0.4221		0.4813	0.4319
	0.4593	0.3944		0.4646	0.4034		0.47	0.4126		0.4756	0.4221
	0.4538	0.3931		0.4589	0.4021		0.4641	0.4112		0.4695	0.4207

## Luminous Flux Bins

Table 1:

Bin Code	Minimum Luminous Flux ( $\Phi_v$ ) @ $I_F = 700\text{mA} / \text{Channel}^{[1,2]}$ (lm)	Maximum Luminous Flux ( $\Phi_v$ ) @ $I_F = 700\text{mA} / \text{Channel}^{[1,2]}$ (lm)
C2	2,120	2,350
D2	2,350	2,600
E2	2,600	2,900

Notes for Table 1:

1. Luminous flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of  $\pm 10\%$  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 ( $V_F$ ) @ $I_F = 700\text{mA}$ /Channel <sup>[1]</sup> (V)	Maximum Forward Voltage ( $V_F$ ) @ $I_F = 700\text{mA}$ /Channel <sup>[1]</sup> (V)
0	19.20 <sup>[2,3]</sup>	23.52 <sup>[2,3]</sup>

Notes for Table 2:

1. LedEngin maintains a tolerance of  $\pm 0.24\text{V}$  for forward voltage measurements.
2. All 4 white Channels have matched  $V_f$  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.

## Absolute Maximum Ratings

Table 5:

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

Notes for Table 5:

- 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.
- Pulse forward current conditions: Pulse Width  $\leq$  10msec and Duty cycle  $\leq$  10%.
- LEDs are not designed to be reverse biased.
- Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 5.
- LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZP-00WW00 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

## Optical Characteristics @ $T_C = 25^{\circ}C$

Table 6:

Parameter	Symbol	Typical	Unit
Luminous Flux (@ $I_F = 700mA$ ) <sup>[1]</sup>	$\Phi_V$	2600	lm
Luminous Flux (@ $I_F = 1000mA$ ) <sup>[1]</sup>	$\Phi_V$	3200	lm
Luminous Efficacy (@ $I_F = 350mA$ )		60	lm/W
Correlated Color Temperature	CCT	3100	K
Chromaticity Coordinates	x,y	0.430, 0.402	
Color Rendering Index (CRI)	$R_a / R_9$	83 / 15	
Viewing Angle <sup>[2]</sup>	$2\theta_{1/2}$	110	Degrees

Notes for Table 6:

- Luminous flux typical value is for all 24 LED dies operating at rated current.
- Viewing Angle is the off-axis angle from emitter centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical Characteristics @ $T_C = 25^{\circ}C$

Table 7:

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

Notes for Table 7:

- 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.

# IPC/JEDEC Moisture Sensitivity Level

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

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

Notes for Table 4:

- 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.

### 25 die (700mA & 1000mA, Rjc=0.6) L70 de-rating

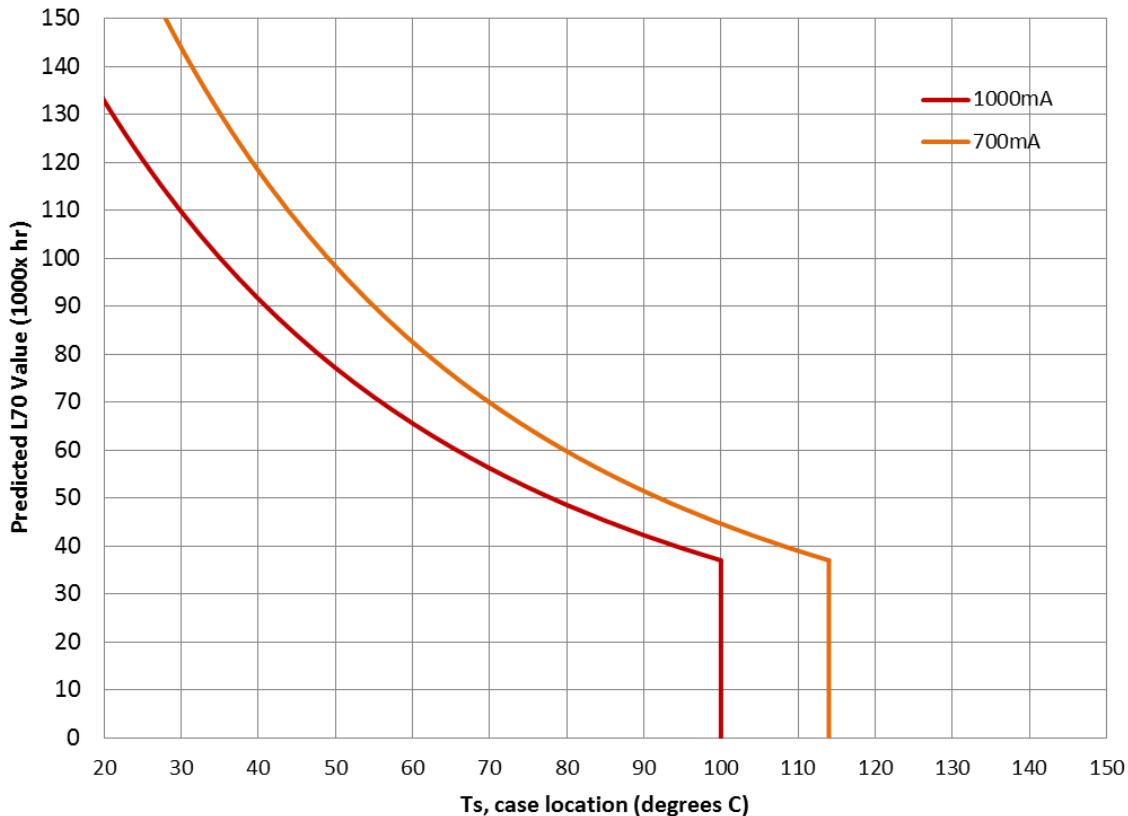


Figure 1: De-rating curve for operation of all dies at 700mA

Notes for Table 4:

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

## Typical Radiation Pattern

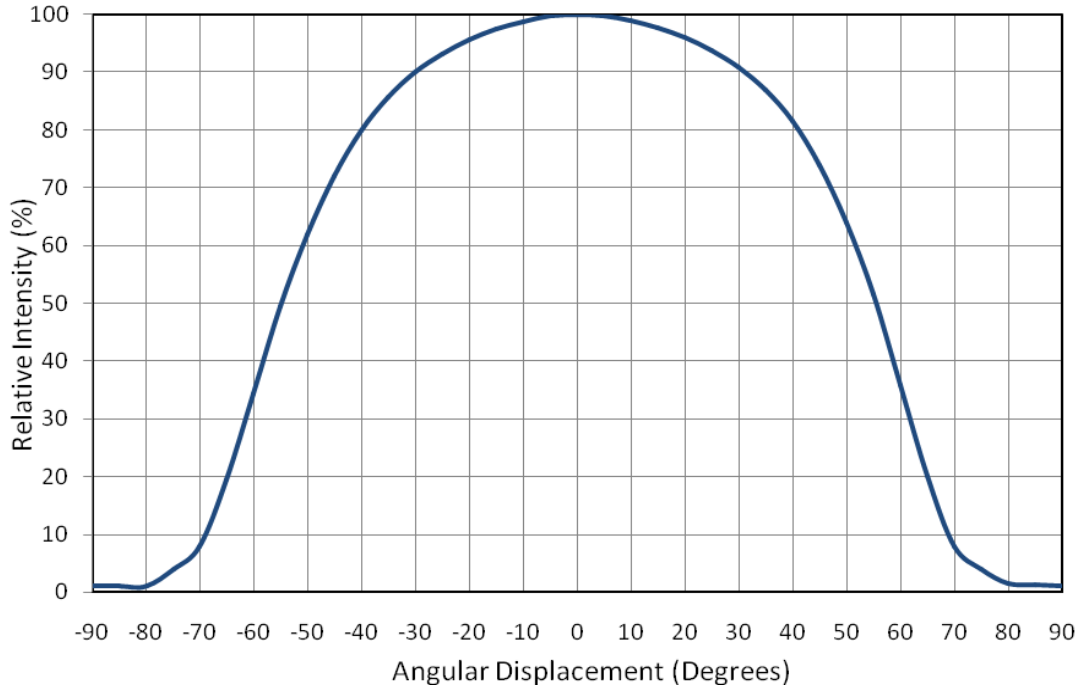


Figure 2: Typical representative spatial radiation pattern.

## Color over Angle Pattern

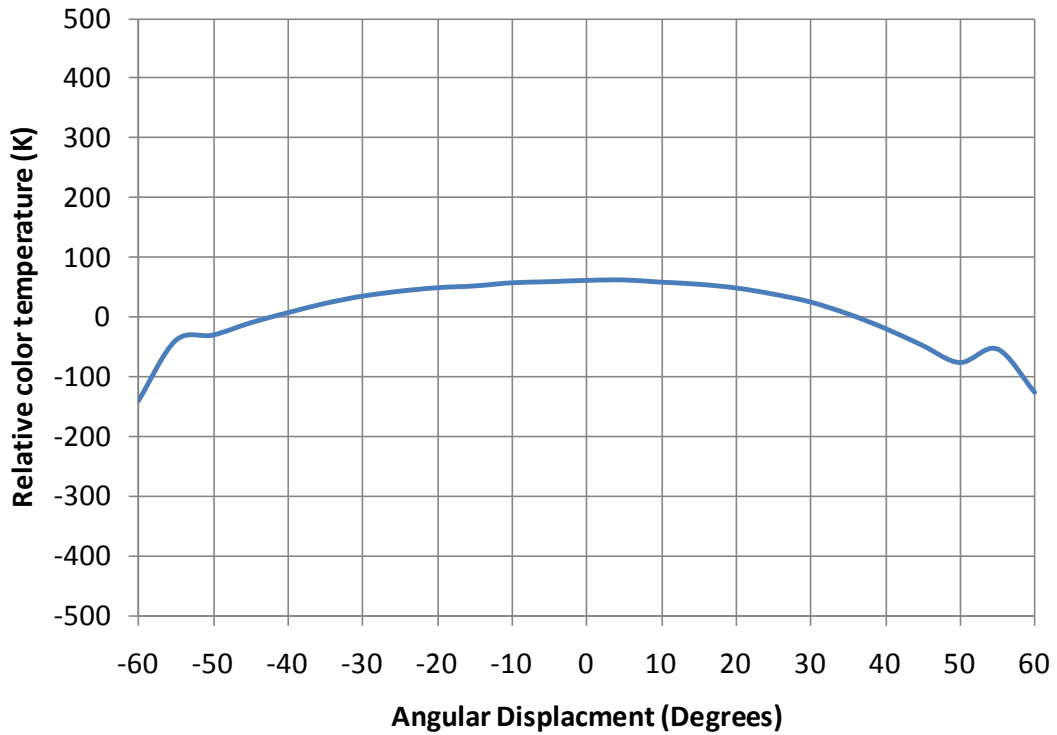


Figure 2: Typical representative color over angle pattern (includes 95% of the luminous flux).

## Absolute Maximum Ratings

Table 5:

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

Notes for Table 5:

- 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.
- Pulse forward current conditions: Pulse Width  $\leq$  10msec and Duty cycle  $\leq$  10%.
- LEDs are not designed to be reverse biased.
- Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 5.
- LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZP-00WW00 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

## Optical Characteristics @ $T_C = 25^{\circ}C$

Table 6:

Parameter	Symbol	Typical	Unit
Luminous Flux (@ $I_F = 700mA$ ) <sup>[1]</sup>	$\Phi_V$	2600	lm
Luminous Flux (@ $I_F = 1000mA$ ) <sup>[1]</sup>	$\Phi_V$	3200	lm
Luminous Efficacy (@ $I_F = 350mA$ )		60	lm/W
Correlated Color Temperature	CCT	3100	K
Chromaticity Coordinates	x,y	0.430, 0.402	
Color Rendering Index (CRI)	$R_a / R_9$	83 / 15	
Viewing Angle <sup>[2]</sup>	$2\theta_{1/2}$	110	Degrees

Notes for Table 6:

- Luminous flux typical value is for all 24 LED dies operating at rated current.
- Viewing Angle is the off-axis angle from emitter centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical Characteristics @ $T_C = 25^{\circ}C$

Table 7:

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

Notes for Table 7:

- 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.



## Reflow Soldering Profile

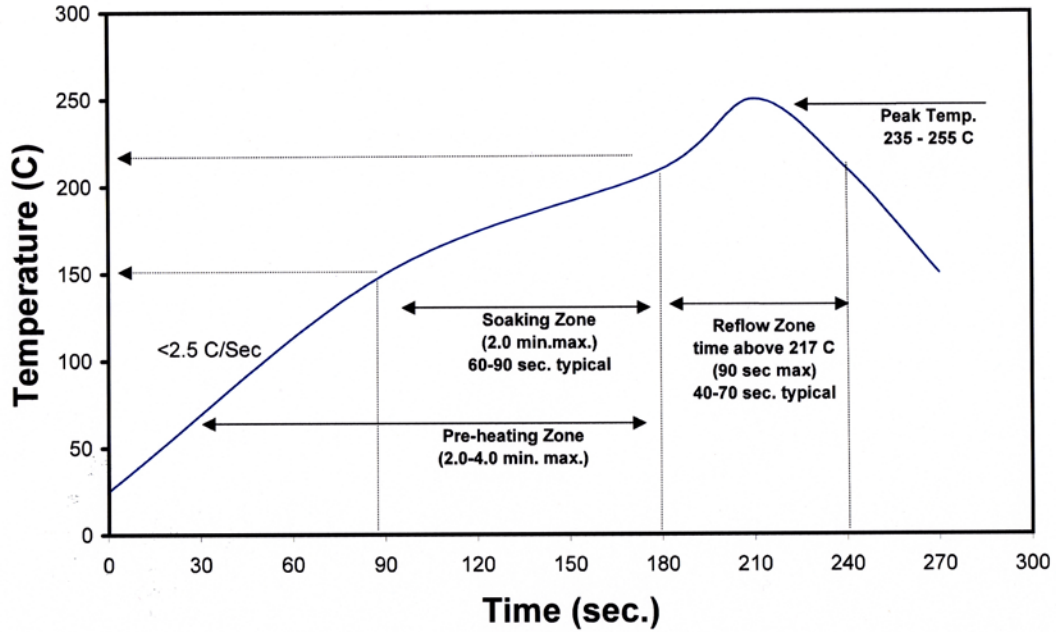


Figure 5: Reflow soldering profile for lead free soldering.

## Typical Relative Spectral Power Distribution

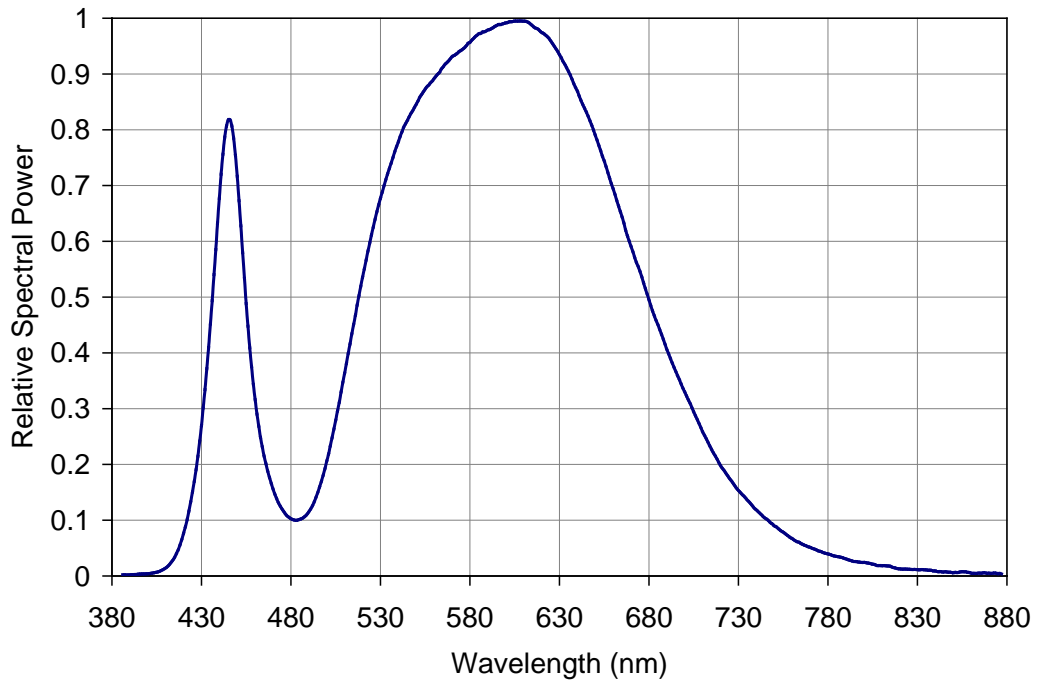


Figure 6: Typical relative spectral power vs. wavelength @  $T_c = 25^\circ\text{C}$ .

## Typical Relative Light Output

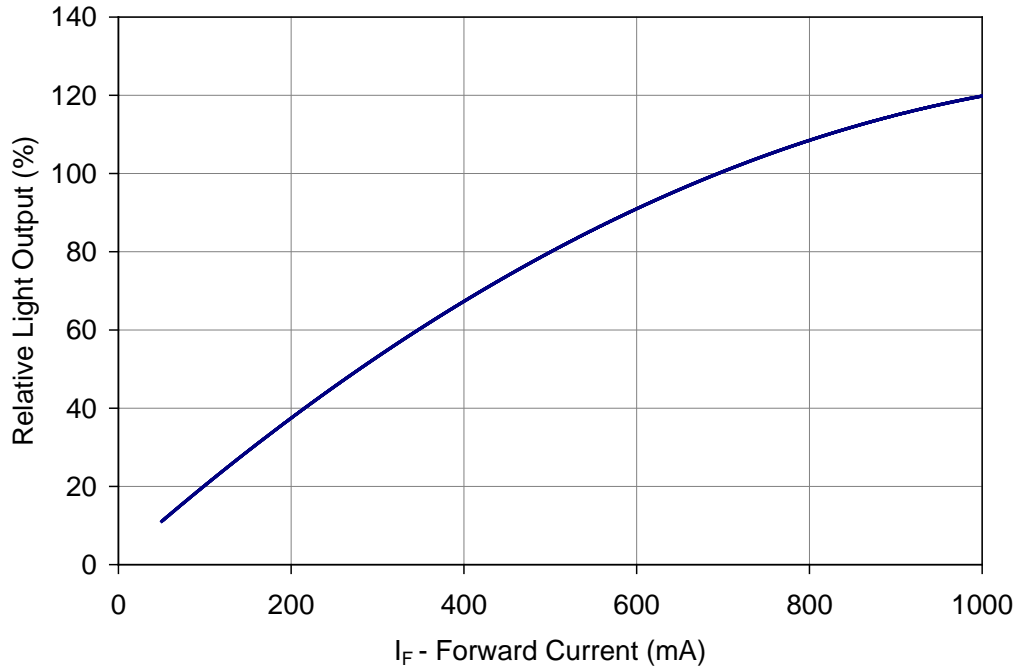


Figure 7: Typical relative light output vs. forward current @ T<sub>c</sub> = 25°C.

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

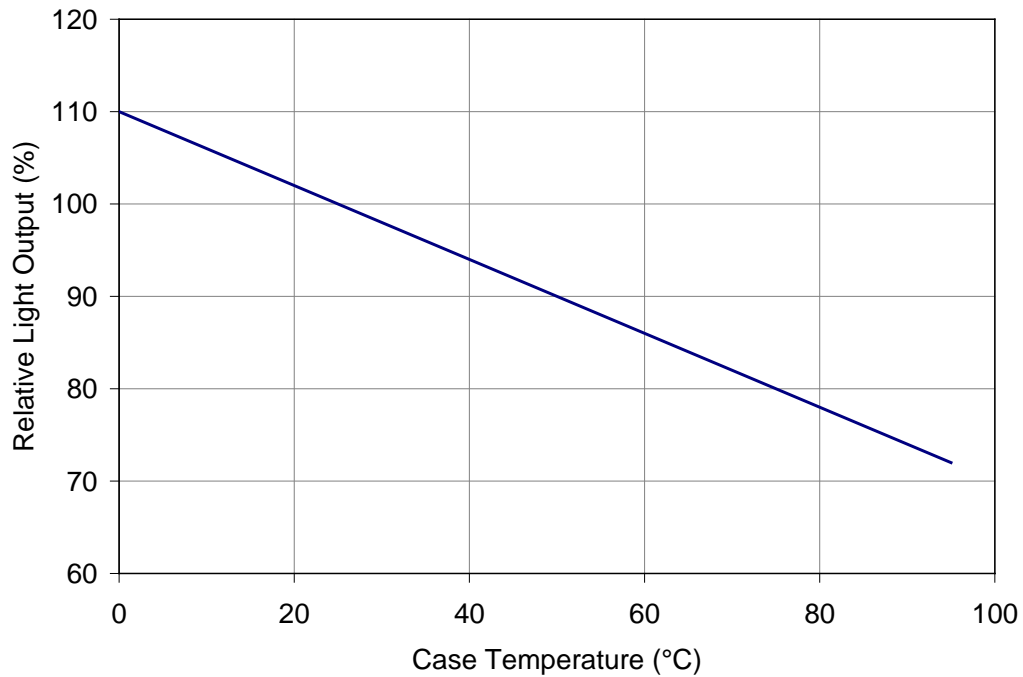


Figure 8: Typical relative light output vs. case temperature.

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

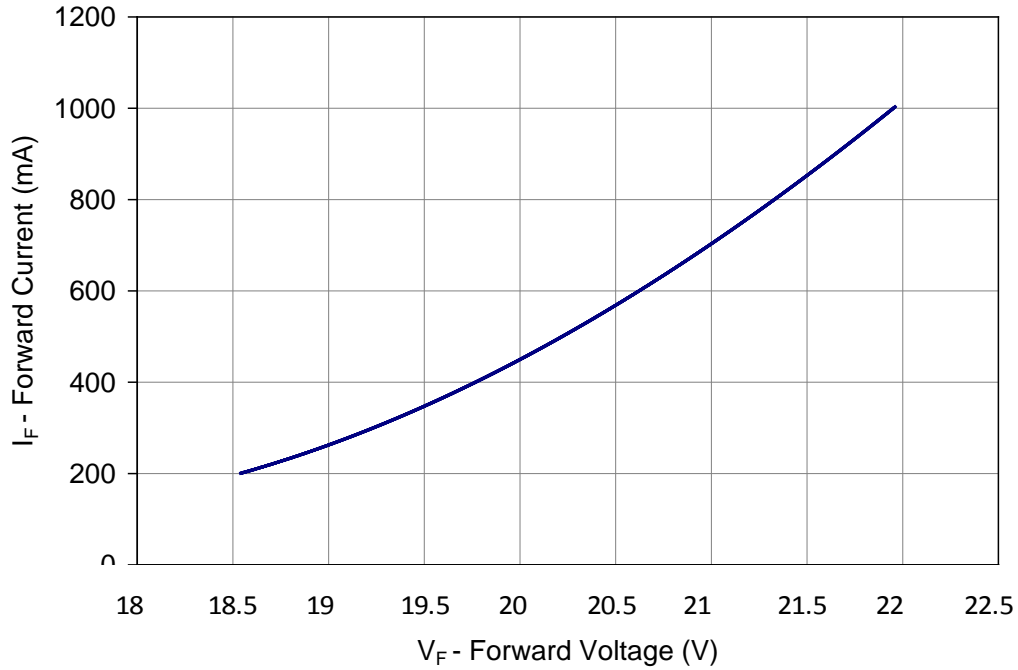


Figure 9: Typical forward current vs. forward voltage @  $T_c$  = at 25°C.

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

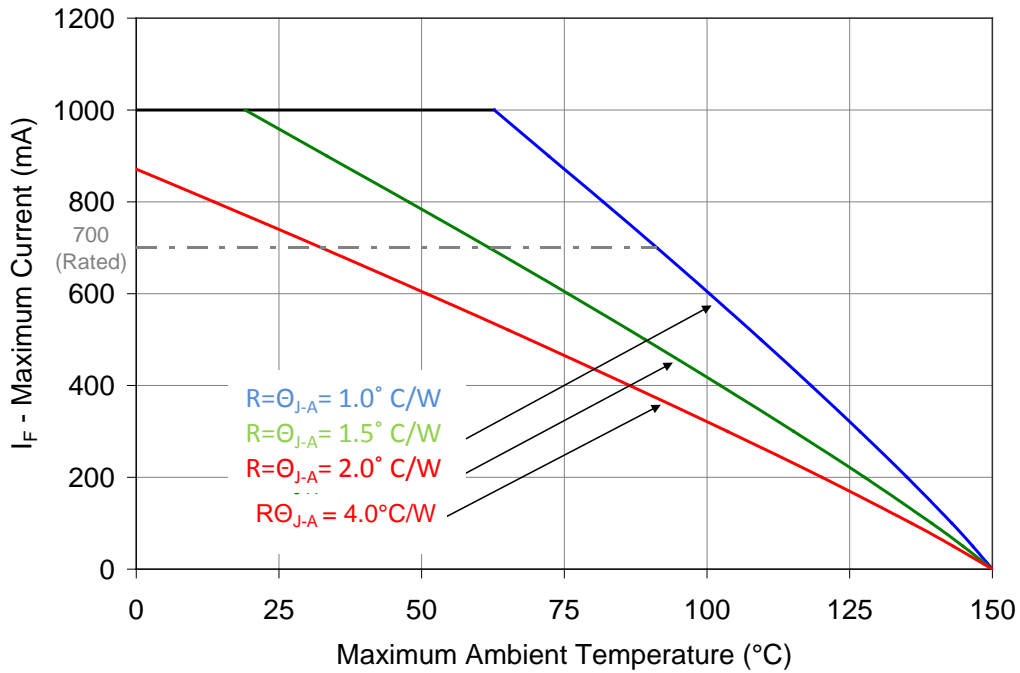


Figure 10: Maximum forward current vs. ambient temperature based on  $T_{j(\text{MAX})} = 150^\circ\text{C}$ .

Notes for Figure 10:

1. Maximum current assumes that all LED dies are operating at rated current.
2.  $R_{\theta_{j-c}}$  [Junction to Case Thermal Resistance] for the LZP-series is typically  $0.6^\circ\text{C/W}$ .
3.  $R_{\theta_{j-a}}$  [Junction to Ambient Thermal Resistance] =  $R_{\theta_{j-c}} + R_{\theta_{c-a}}$  [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”

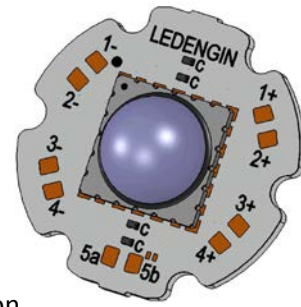
H, I, J, K – designates kit options

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”™ 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”™ 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”™ 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](mailto:Sales@ledengin.com) or (408) 492-0620 for more information.