Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

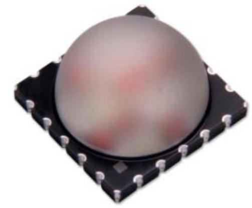
We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

High Luminous Efficacy
RGBA LED Emitter

LZC-03MA07



Key Features

- Ultra-bright, Ultra-compact 40W RGBA LED
- Individually addressable Red, Green, Blue and Amber channels
- Small high density foot print – 9.0mm x 9.0mm
- Surface mount ceramic package with integrated glass lens
- Exceptionally low Thermal Resistance (0.7°C/W)
- Electrically neutral thermal path
- Extreme Luminous Flux density
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on 4-channel MCPCB (optional)
- Recommended use with LLxx-3T08 family of High Efficiency / High Uniformity color-mixing lenses for perfect color uniformity from 8 to 32 deg.

Typical Applications

- Architectural lighting
- Entertainment
- Stage and Studio lighting
- Accent lighting

Description

The LZC-03MA07 RGBA LED emitter enables a full spectrum of brilliant colors with the highest light output, highest flux density, and superior color mixing available. It outperforms other colored lighting solutions with multiple red, green, blue and amber LED die in a single, compact emitter. With 40W power capability and a 9.0mm x 9.0mm ultra-small footprint, this package provides exceptional luminous flux density. LED Engin’s RGBA LED offers ultimate design flexibility with four individually addressable color channels. The patented design with thermally and electrically isolated pads has unparalleled thermal and optical performance. The high quality materials used in the package are chosen to optimize light output and minimize stresses which results in monumental reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Part Number Options

Base part number

Part number	Description
LZC-03MA07-xxxx	LZC emitter
LZC-B3MA07-xxxx	LZC emitter on 4 channel 4x3 Star MCPCB

Bin kit option codes

MA, Red-Green-Blue-Amber (RGBA)			
Kit number suffix	**Min flux Bin**	**Color Bin Range**	**Description**
0000	11R	R2 – R2	Red, full distribution flux; full distribution wavelength
	14G	G2 – G3	Green, full distribution flux; full distribution wavelength
	03B	B03 – B03	Blue, full distribution flux; full distribution wavelength
	11A	A9 – A9	Amber, full distribution flux; full distribution wavelength

Notes:
1. Default bin kit option is -0000

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Luminous Flux Bins

Table 1:

Bin Code	Minimum Luminous Flux (Φ_V) @ I_F = 700mA [1,2] (lm)				Maximum Luminous Flux (Φ_V) @ I_F = 700mA [1,2] (lm)			
	3 Red	3 Green	3 Blue	3 Amber	3 Red	3 Green	3 Blue	3 Amber
11R	260				420			
14G		300				480		
03B			48				77	
04B			77				130	
11A				240				400

Notes for Table 1:
1. Luminous flux performance guaranteed within published operating conditions. LED Engin maintains a tolerance of ±10% on flux measurements.
2. Each flux value consists of 3 dies from the same color in series for binning purposes.

Dominant Wavelength Bins

Table 2:

Bin Code	Minimum Dominant Wavelength (λ_D) @ I_F = 700mA [1,2] (nm)				Maximum Dominant Wavelength (λ_D) @ I_F = 700mA [1,2] (nm)			
	Red	Green [2]	Blue	Amber	Red	Green [2]	Blue	Amber
R2	618				630			
G2		520				525		
G3		525				530		
B03			453				460	
A9				590				595

Notes for Table 2:
1. LED Engin maintains a tolerance of ± 0.5nm on dominant wavelength measurements.

Forward Voltage Bin

Table 3:

Bin Code	Minimum Forward Voltage (V_F) @ I_F = 700mA [1] (V)				Maximum Forward Voltage (V_F) @ I_F = 700mA [1] (V)			
	Red	Green	Blue	Amber	Red	Green	Blue	Amber
0	6.00	9.30	9.30	6.00	8.00	12.00	12.00	8.00

Notes for Table 3:
1. Forward Voltage is binned with all three LED dice connected in series.
2. LED Engin maintains a tolerance of ± 0.12V for forward voltage measurements for the three LEDs.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current [1]	I_F	1000	mA
Peak Pulsed Forward Current [2]	I_{FP}	1500	mA
Reverse Voltage	V_R	See Note 3	V
Storage Temperature	T_{stg}	-40 ~ +150	°C
Junction Temperature [Blue, Green]	T_J	150	°C
Junction Temperature [Red, Amber]	T_J	125	°C
Soldering Temperature [4]	T_{sol}	260	°C
Allowable Reflow Cycles		6	
ESD Sensitivity [5]		> 8,000 V HBM Class 3B JESD22-A114-D	

Notes for Table 4:
1. Maximum DC forward current is determined by the overall thermal resistance and ambient temperature. Follow the curves in Figure 12 for current derating.
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. LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZC-03MA07in 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 5:

Parameter	Symbol	Typical				Unit
		Red	Green	Blue [1]	Amber	
Luminous Flux (@ I_F = 700mA)	Φ_V	340	430	100	320	lm
Luminous Flux (@ I_F = 1000mA)	Φ_V	475	560	130	410	lm
Dominant Wavelength	λ_D	623	523	460	590	nm
Viewing Angle [2]	$2\Theta_{½}$	95				Degrees
Total Included Angle [3]	$\Theta_{0.9}$	115				Degrees

Notes for Table 5:
1. When operating the Blue LED, observe IEC 60825-1 class 2 rating. Do not stare into the beam.
2. Viewing Angle is the off axis angle from emitter centerline where the luminous intensity is ½ of the peak value.
3. Total Included Angle is the total angle that includes 90% of the total luminous flux.

Electrical Characteristics @ T_C = 25°C

Table 6:

Parameter	Symbol	Typical				Unit
		3 Red	3 Green	3 Blue	3 Amber	
Forward Voltage (@ I_F = 700mA) [1]	V_F	7.5	10.8	9.6	7.2	V
Forward Voltage (@ I_F = 1000mA) [1]	V_F	8.1	11.2	10.0	7.8	V
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_J$	-5.7	-8.7	-9.0	-5.7	mV/°C
Thermal Resistance (Junction to Case)	$R\Theta_{J-C}$	0.7				°C/W

Notes for Table 6:
1. Forward Voltage typical value is for three LED dice from the same color dice connected in series.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

IPC/JEDEC Moisture Sensitivity Level

Table 7 - 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 7:

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.

Based on long-term WHTOL testing, LED Engin projects that the LZ Series will deliver, on average, 70% Lumen Maintenance at 65,000 hours of operation at a forward current of 700 mA. This projection is based on constant current operation with junction temperature maintained at or below 125°C.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Mechanical Dimensions (mm)

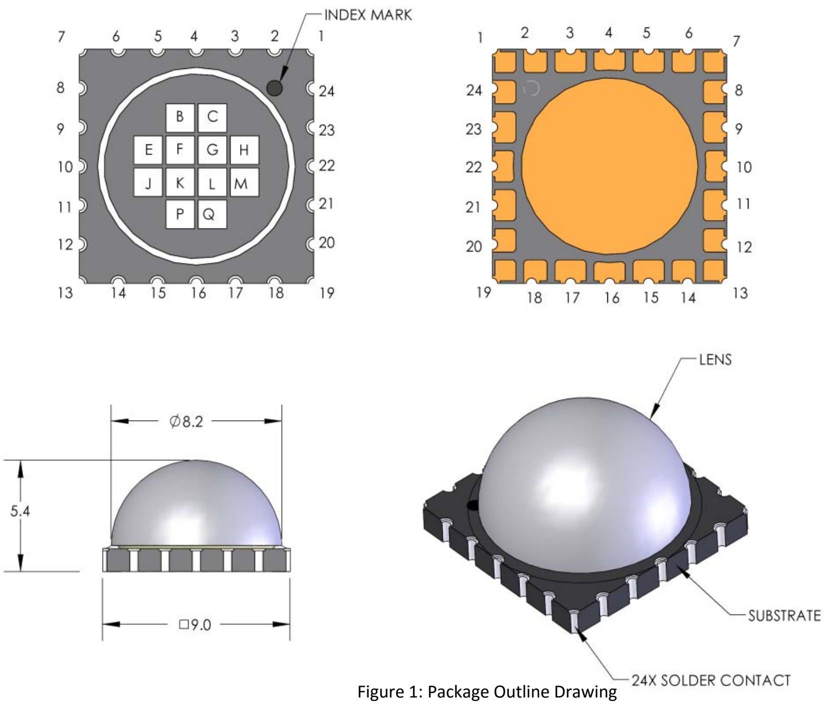


Figure 1: Package Outline Drawing

Pin Out			
Pin	**Die**	**Color**	**Polarity**
1	G	Red	+
2	G	Red	-
3	C	Green	+
4	C	Green	-
5	B	Amber	+
6	B	Amber	-
7	F	Blue	-
8	F	Blue	+
9	E	Green	+
10	E	Green	-
11	J	Red	-
12	J	Red	+
13	K	Amber	-
14	K	Amber	+
15	P	Blue	-
16	P	Blue	+
17	Q	Red	-
18	Q	Red	+
19	L	Green	+
20	L	Green	-
21	M	Blue	-
22	M	Blue	+
23	H	Amber	+
24	H	Amber	-

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

Recommended Solder Pad Layout (mm)

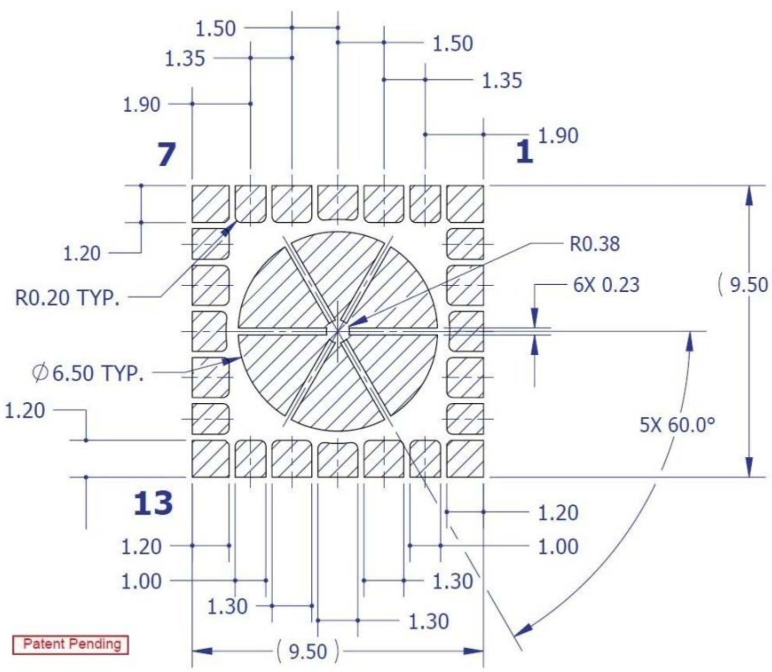


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad.

Note for Figure 2a:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Recommended Solder Mask Layout (mm)

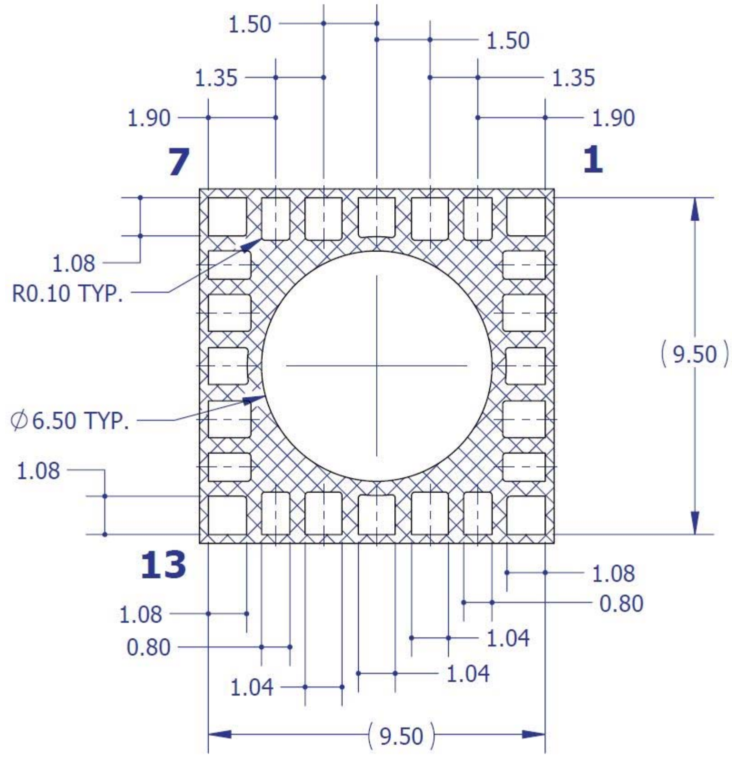


Figure 2b: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2b:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.

Reflow Soldering Profile

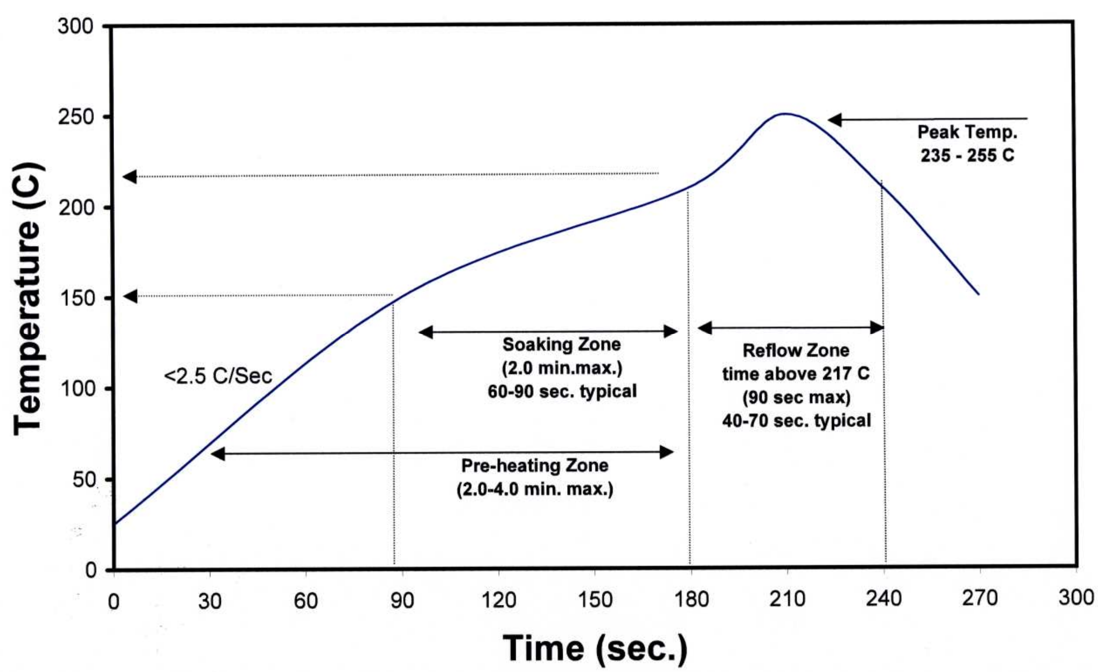


Figure 3: Reflow soldering profile for lead free soldering.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Typical Radiation Pattern

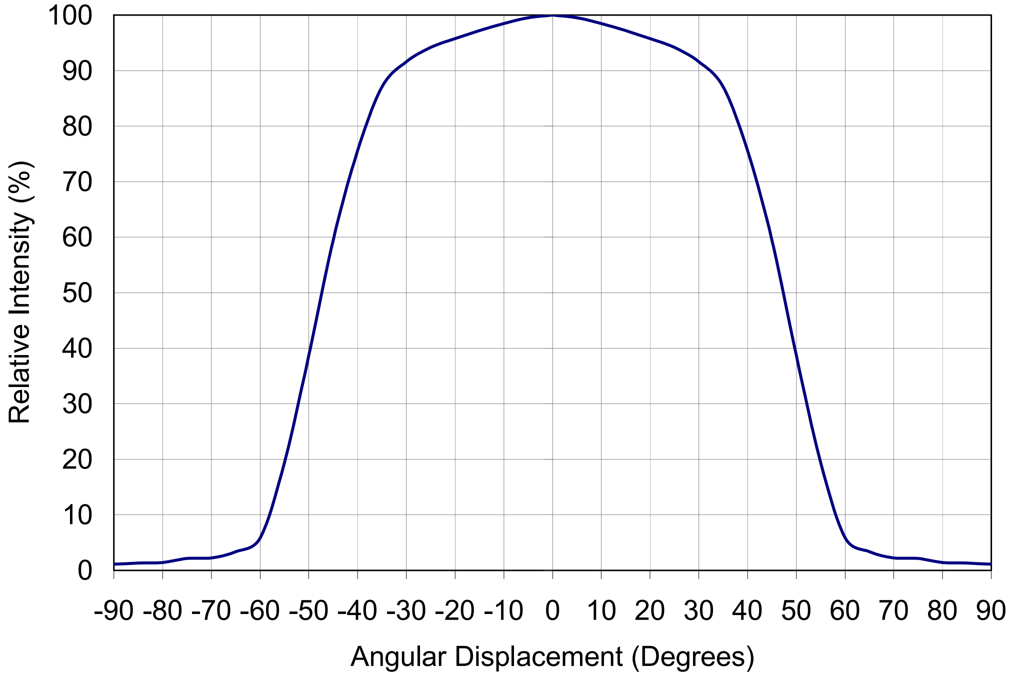


Figure 4: Typical representative spatial radiation pattern.

Typical Relative Spectral Power Distribution

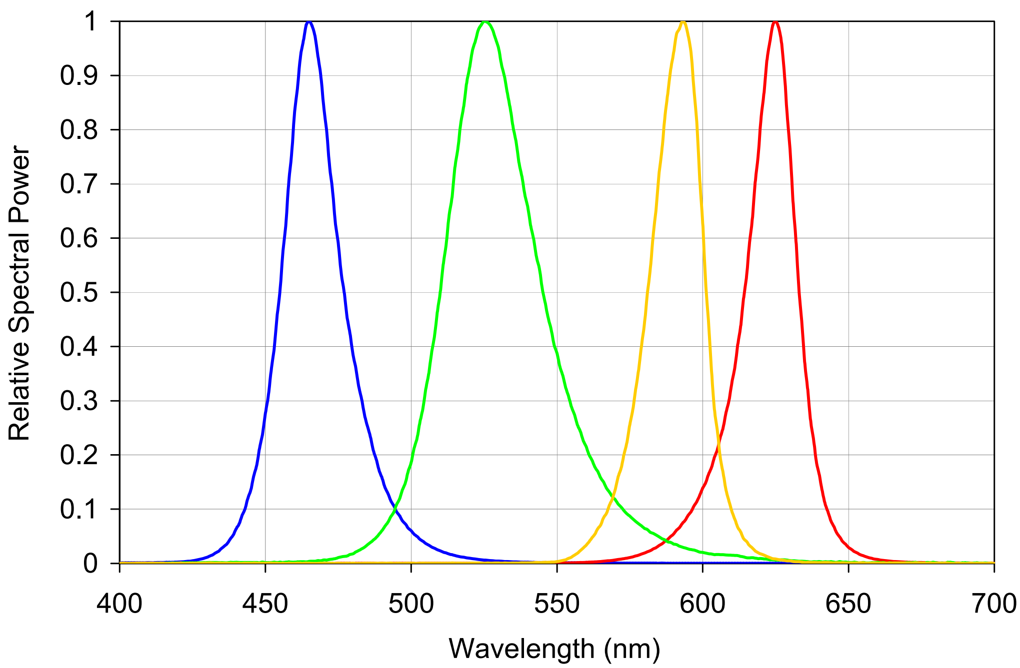


Figure 5: Typical relative spectral power vs. wavelength @ T_C = 25°C.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Typical Dominant Wavelength Shift over Forward Current

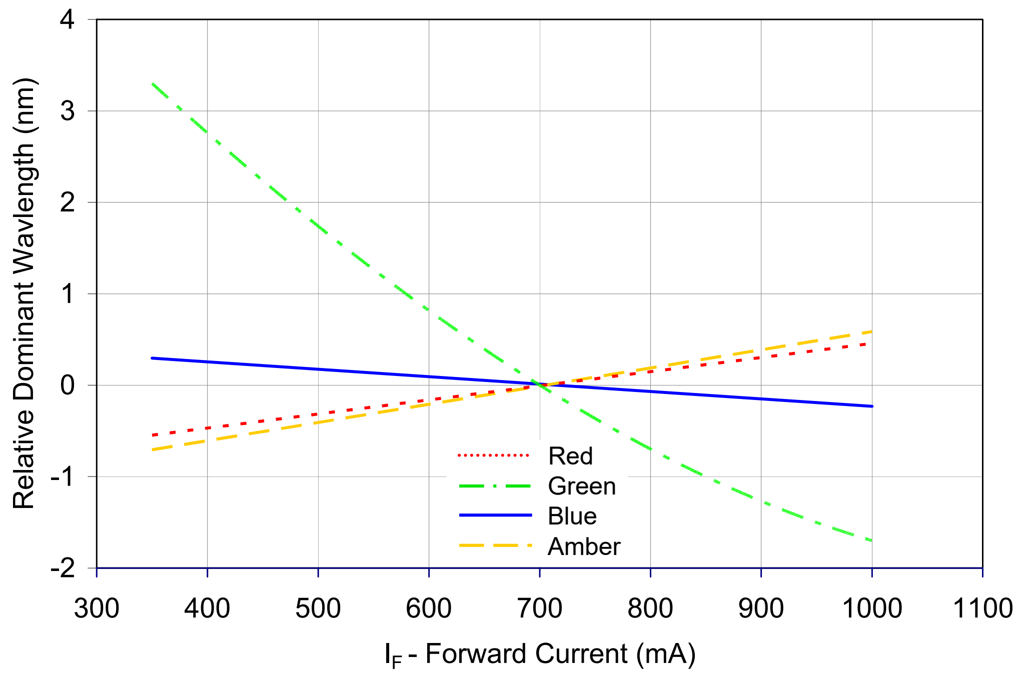


Figure 6: Typical dominant wavelength shift vs. forward current @ T_C = 25°C.

Dominant Wavelength Shift over Temperature

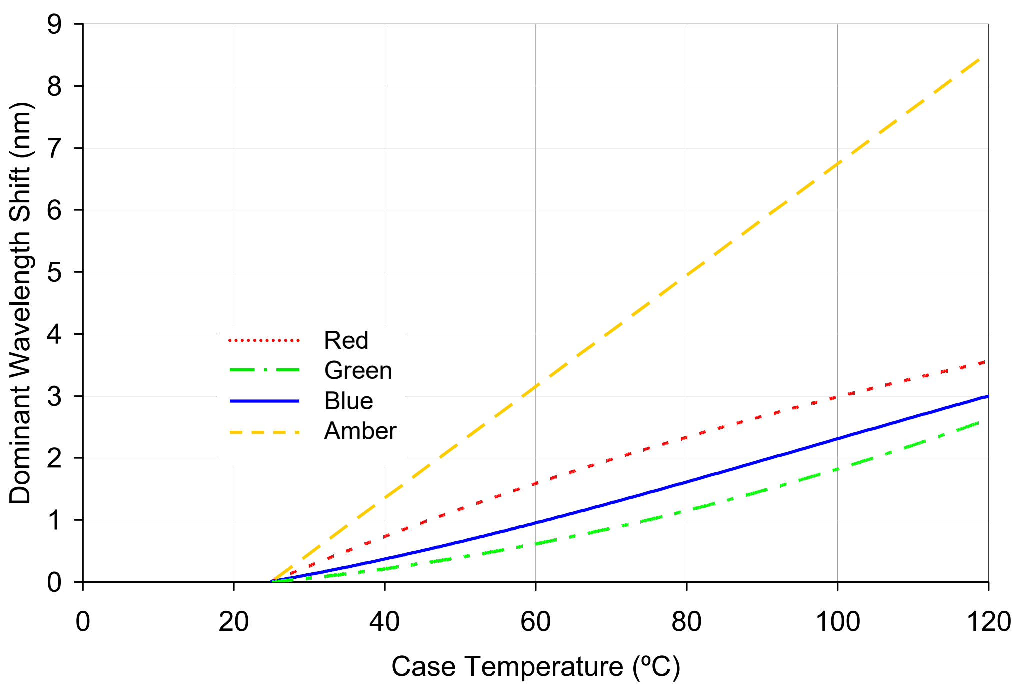


Figure 7: Typical dominant wavelength shift vs. case temperature.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Typical Relative Light Output

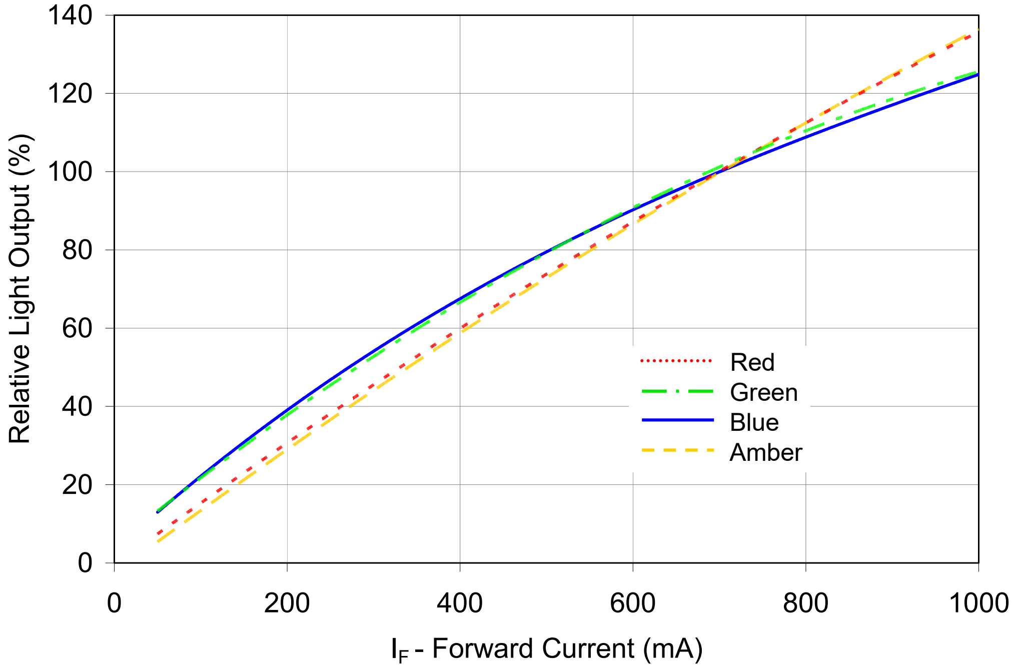


Figure 8: Typical relative light output vs. forward current @ T_C = 25°C.

Typical Relative Light Output over Temperature

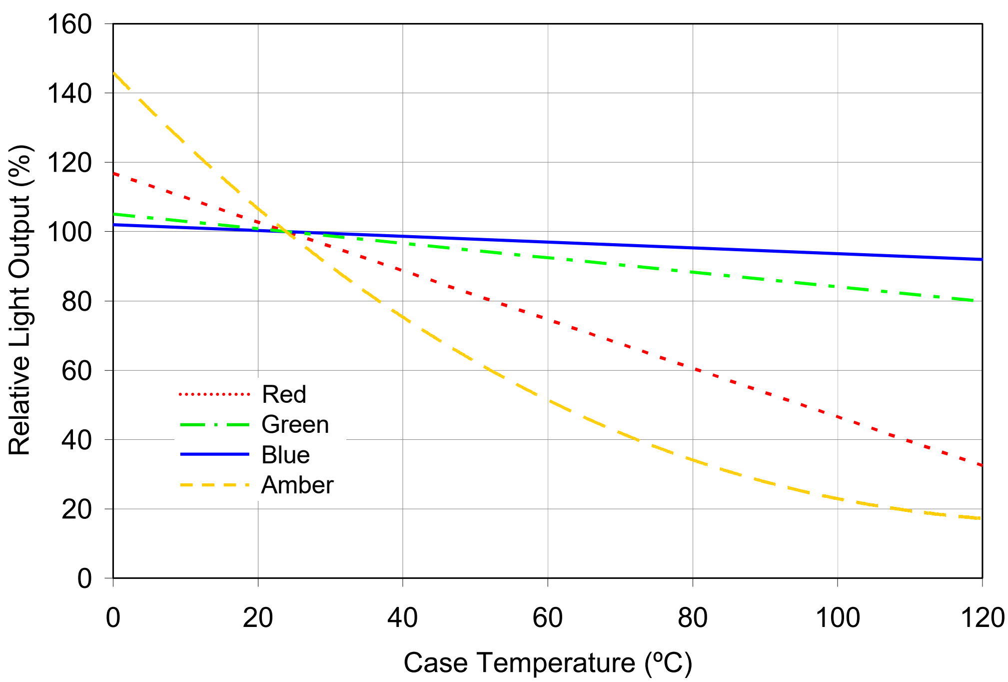


Figure 9: Typical relative light output vs. case temperature.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Typical Forward Current Characteristics

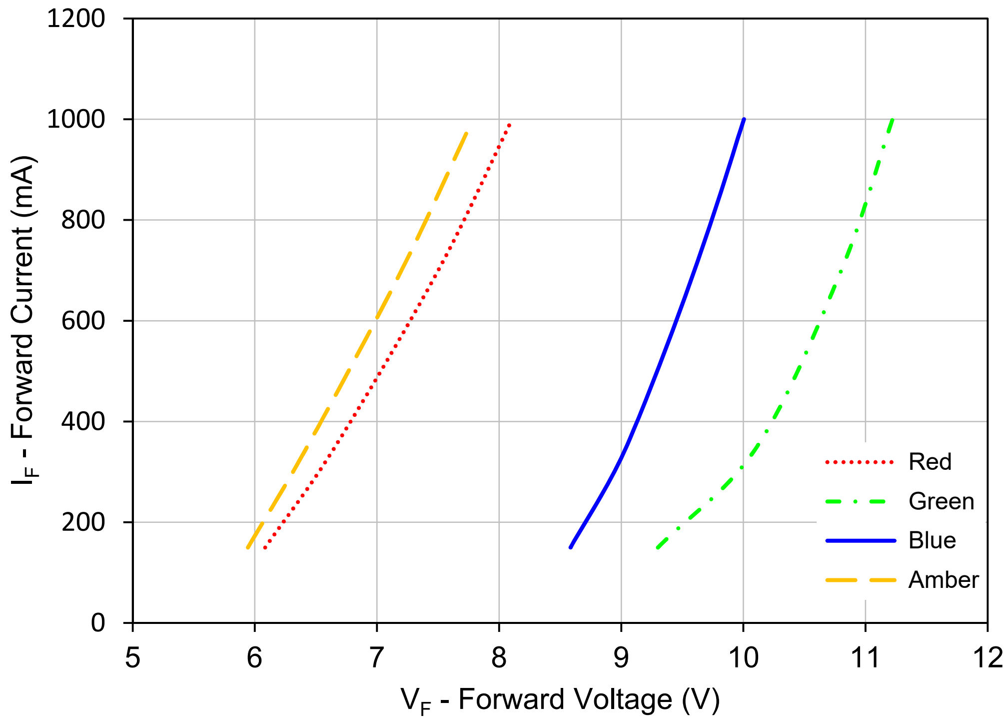


Figure 10: Typical forward current vs. forward voltage @ T_C = 25°C.

Current De-rating

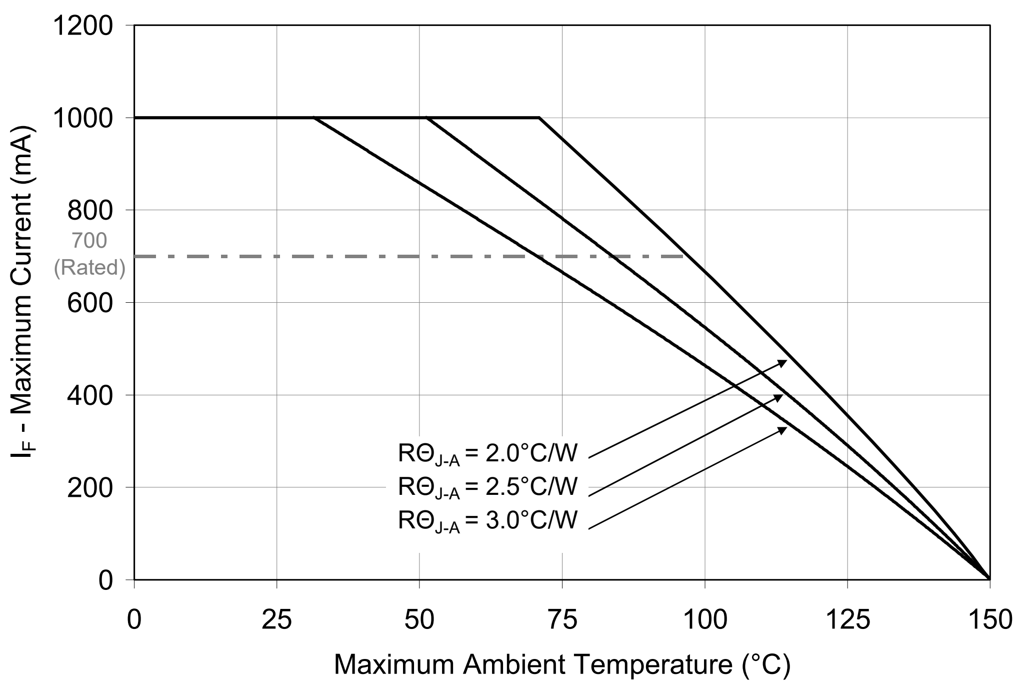


Figure 11: Maximum forward current vs. ambient temperature based on $T_{J(MAX)}$ = 150°C.

Notes for Figure 11:

1. Maximum current assumes that all 12 LED dice are operating concurrently at the same current.
2. $R\Theta_{J-C}$ [Junction to Case Thermal Resistance] for the LZC-03MA07 is typically <0.7°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].

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Emitter Tape and Reel Specifications (mm)

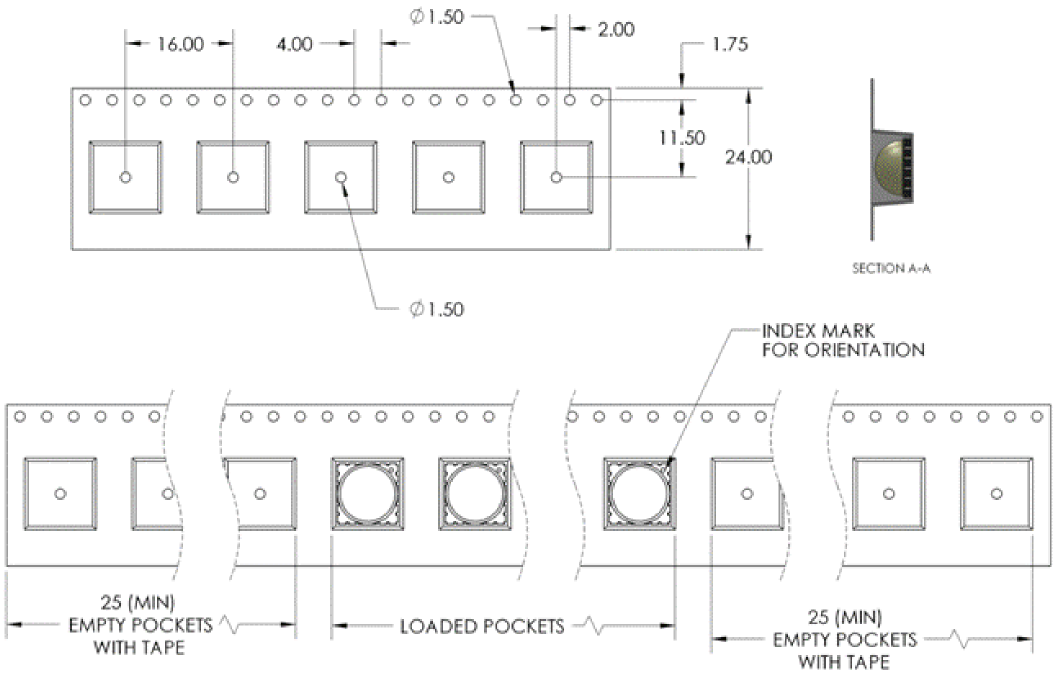


Figure 12: Emitter carrier tape specifications (mm).

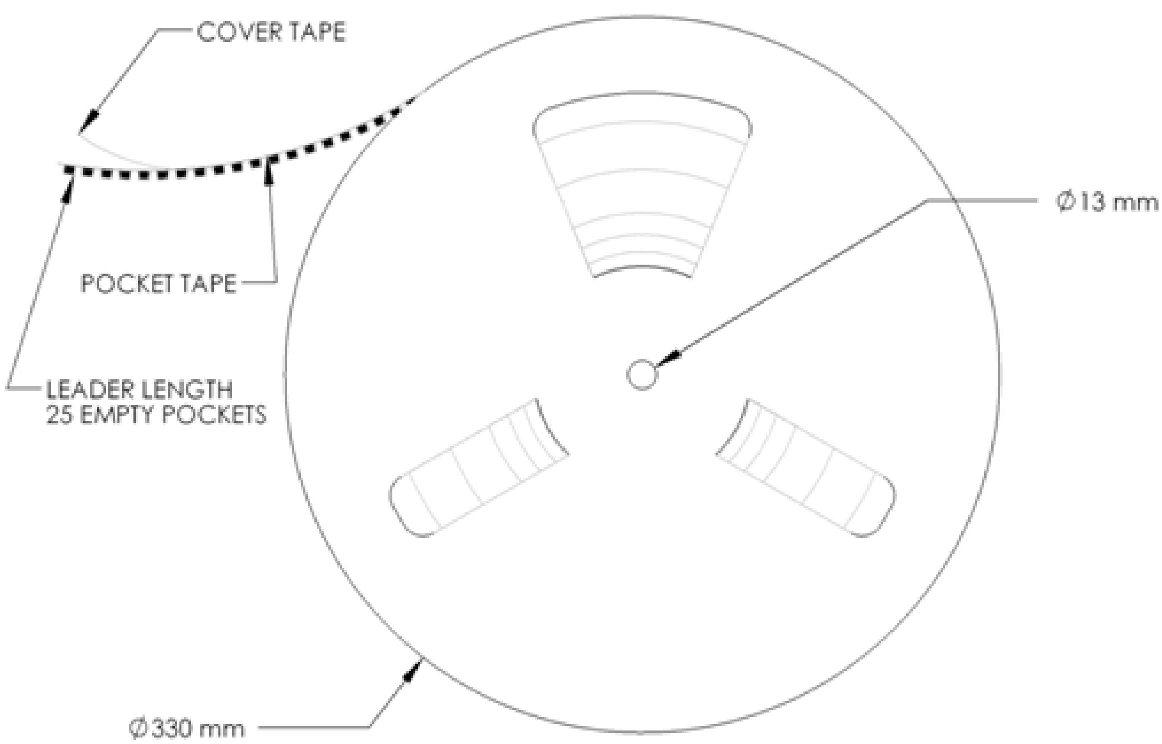


Figure 13: Emitter Reel specifications (mm).

LZC MCPCB Family

Part number	Type of MCPCB	Diameter (mm)	Emitter + MCPCB Thermal Resistance (°C/W)	Typical V_f (V)	Typical I_f (mA)
LZC-Bxxxxx	4-channel	28.3	0.7 + 0.1 = 0.8	7.0 – 12.6	4 x 700

- **Mechanical Mounting of MCPCB**
  - Mechanical stress on the emitter that could be caused by bending the MCPCB should be avoided. The stress can cause the substrate to crack and as a result might lead to cracks in the dies.
  - Therefore special attention needs to be paid to the flatness of the heat sink surface and the torque on the screws. Maximum torque should not exceed 1 Nm (8.9 lbf/in).
  - Care must be taken when securing the board to the heatsink to eliminate bending of the MCPCB. This can be done by tightening the three M3 screws (or #4-40) in steps and not all at once. This is analogous to tightening a wheel of an automobile
  - It is recommended to always use plastic washers in combination with three screws. Two screws could more easily lead to bending of the board.
  - If non taped holes are used with self-tapping screws it is advised to back out the screws slightly after tighten (with controlled torque) and retighten the screws again.

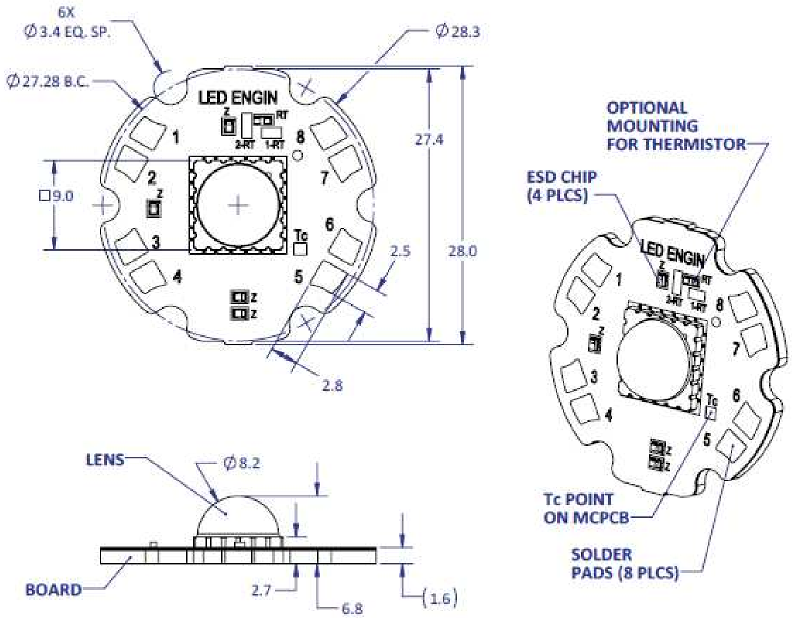
- **Thermal interface material**
  - To properly transfer the heat from the LED to the heatsink a thermally conductive material is required when mounting the MCPCB to the heatsink
  - There are several materials which can be used as thermal interface material, such as thermal paste, thermal pads, phase change materials and thermal epoxies. Each has pro's and con's depending on the application. For our emitter it is critical to verify that the thermal resistance is sufficient for the selected emitter and its environment.
  - To properly transfer the heat from the MCPCB to the heatsink also special attention should be paid to the flatness of the heatsink.

- **Wire soldering**
  - For easy soldering of wires to the MCPCB it is advised to preheat the MCPCB on a hot plate to a maximum of 150°. Subsequently apply the solder and additional heat from the solder iron to initiate a good solder reflow. It is recommended to use a solder iron of more than 60W. We advise to use lead free, no-clean solder. For example SN-96.5 AG-3.0 CU 0.5 #58/275 from Kester (pn: 24-7068-7601)

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

LZC-Bxxxxx

4-Channel MCPCB Mechanical Dimensions (mm)



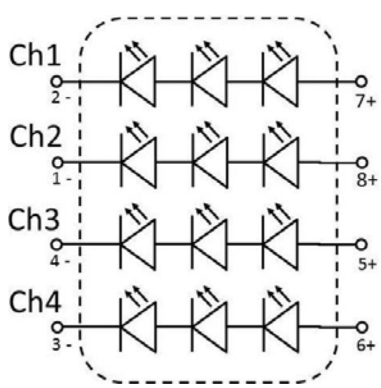
Pad function with:			
LZC-03MA07			
Pad	**Polarity**	**Ch.**	**Function**
7	Anode +	1	Red
2	Cathode -		
8	Anode +	2	Green
1	Cathode -		
5	Anode +	3	Blue
4	Cathode -		
6	Anode +	4	Amber
3	Cathode -		

Notes:

- Unless otherwise noted, the tolerance = ± 0.20 mm.
- Slots in MCPCB are for M3 or #4-40 mounting screws.
- LED Engin recommends using plastic washers to electrically insulate screws from solder pads and electrical traces.
- LED Engin recommends using thermal interface material when attaching the MCPCB to a heat sink.
- The thermal resistance of the MCPCB is: RΘC-B 0.1°C/W

Components used

MCPCB:	SuperMCPCB (copper)	(Bridge Semiconductor)
ESD chips:	BZX884-C18	(NXP, for 3 LED dies in series)



LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com

Company Information

LED Engin, Inc., based in California's Silicon Valley, specializes in ultra-bright, ultra compact solid state lighting solutions allowing lighting designers & engineers the freedom to create uncompromised yet energy efficient lighting experiences. The LuxiGen™ Platform — an emitter and lens combination or integrated module solution, delivers superior flexibility in light output, ranging from 3W to 90W, a wide spectrum of available colors, including whites, multi-color and UV, and the ability to deliver upwards of 5,000 high quality lumens to a target. The small size combined with powerful output allows for a previously unobtainable freedom of design wherever high-flux density, directional light is required. LED Engin'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.

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

LED Engin reserves the right to make changes to improve performance without notice.

Please contact sales@ledengin.com or (408) 922-7200 for more information.

LED Engin | 651 River Oaks Parkway | San Jose, CA 95134 USA | **ph** +1 408 922 7200 | **fax** +1 408 922 0158 | **em** sales@ledengin.com | www.ledengin.com