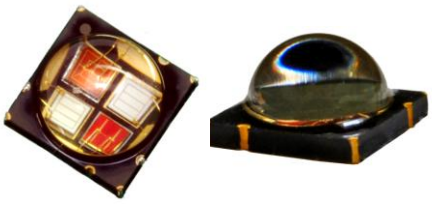
High Luminous Efficacy
RGBA LED Emitter

LZ4-00MA00



Key Features

- High Luminous Efficacy 10W RGBA LED
- Individually addressable Red, Green, Blue and Amber die
- White point tunable to any CCT or hue with enhanced CRI
- Ultra-small foot print – 7.0mm x 7.0mm
- Surface mount ceramic package with integrated glass lens
- Very low Thermal Resistance (1.1°C/W)
- Very high Luminous Flux density
- JEDEC Level 1 for Moisture Sensitivity Level
- Autoclave compliant (JEDEC JESD22-A102-C)
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on Standard MCPCB (optional)

Typical Applications

- Architectural Lighting
- Retail Spot and Display Lighting
- Stage and Studio Lighting
- Hospitality Lighting
- Museum Lighting
- Dental and Medical Illumination
- Microscope Illumination
- Video Walls and Full Color Displays

Description

The LZ4-00MA00 RGBA LED emitter contains one red, green, blue and amber LED die which provides 10W power in an extremely small package. With a 7.0mm x 7.0mm ultra-small footprint, this package provides exceptional luminous flux density. LED Engin's RGBA LED offers ultimate design flexibility with individually addressable die. The LZ4-00MA00 is capable of producing any white color temperature with CRI values on the order of 90+ and millions of colors. The patent-pending design 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.

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Part number options

Base part number

Part number	Description
LZ4-00MA00-xxxx	LZ4 emitter
LZ4-20MA00-xxxx	LZ4 emitter on 4 channel Standard Star MCPCB

Bin kit option codes

MA, Red-Green-Blue-Amber (RGBA)			
Kit number suffix	**Min flux Bin**	**Color Bin Range**	**Description**
0000	09R	R2 – R2	Red full distribution flux; full distribution wavelength
	12G	G2 – G3	Green full distribution flux; full distribution wavelength
	01B	B01– B02	Blue full distribution flux; full distribution wavelength
	01A	A9 – A9	Amber full distribution flux; full distribution wavelength

Notes:
1. Default bin kit option is -0000

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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)			
	Red	Green	Blue	Amber	Red	Green	Blue	Amber
09R	90				140			
12G		125				195		
01B			17				27	
02B			27				43	
01A				60				95

Notes for Table 1:
1. Luminous flux performance guaranteed within published operating conditions. LED Engin maintains a tolerance of ±10% on flux measurements.
2. Future products will have even higher levels of radiant flux performance. Contact LED Engin Sales for updated information.

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		
B01			452				457	
B02			457				462	
A9				590				595

Notes for Table 2:
1. LED Engin maintains a tolerance of ± 1.0nm on dominant wavelength measurements.
2. Green LEDs are binned for dominant wavelength @ I_F = 350mA. Refer to Figure 6 for typical dominant wavelength shift over forward current.

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	2.00	3.20	3.20	2.24	2.96	4.40	4.48	3.44

Notes for Table 3:
1. LED Engin maintains a tolerance of ± 0.04V on forward voltage measurements.

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Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current (@ T_J = 135°C) [1]	I_F	1200	mA
DC Forward Current (@ T_J = 150°C)	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	
Autoclave Conditions [5]		121°C at 2 ATM, 100% RH for 168 hours	
ESD Sensitivity [6]		> 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 11 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 3.
5. Autoclave Conditions per JEDEC JESD22-A102-C.
6. LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZ4-00MA00 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 5:

Parameter	Symbol	Typical				Unit
		Red	Green	Blue [1]	Amber	
Luminous Flux (@ I_F = 700mA)	Φ_V	115	155	30	75	lm
Luminous Flux (@ I_F = 1000mA)	Φ_V	160	200	40	95	lm
Dominant Wavelength [2,3,4]	λ_D	623	523	460	590	nm
Viewing Angle [5]	$2\Theta_{½}$	95				Degrees
Total Included Angle [6]	$\Theta_{0.9}$	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. Red, Blue and Amber dominant wavelength @ I_F = 700mA. Green dominant wavelength @ I_F = 350mA.
3. Refer to Figure 6 for typical dominant wavelength shift over forward current.
4. Refer to Figure 7 for typical dominant wavelength shift over temperature.
5. Viewing Angle is the off axis angle from emitter centerline where the luminous intensity is ½ of the peak value.
6. 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
		Red	Green	Blue	Amber	
Forward Voltage (@ I_F = 700mA)	V_F	2.2	3.5	3.5	2.5	V
Forward Voltage (@ I_F = 1000mA)	V_F	2.4	3.7	3.7	2.7	V
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_J$	-1.9	-2.9	-3.0	-2.8	mV/°C
Thermal Resistance (Junction to Case)	$R\Theta_{J\text{-}C}$	1.1				°C/W

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IPC/JEDEC Moisture Sensitivity Level

Table 7 - IPC/JEDEC J-STD-20 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 is the sum of the default value of 24 hours for the semiconductor manufacturer's exposure time (MET) between bake and bag and the floor life of maximum time allowed out of the bag at the end user of distributor's facility.

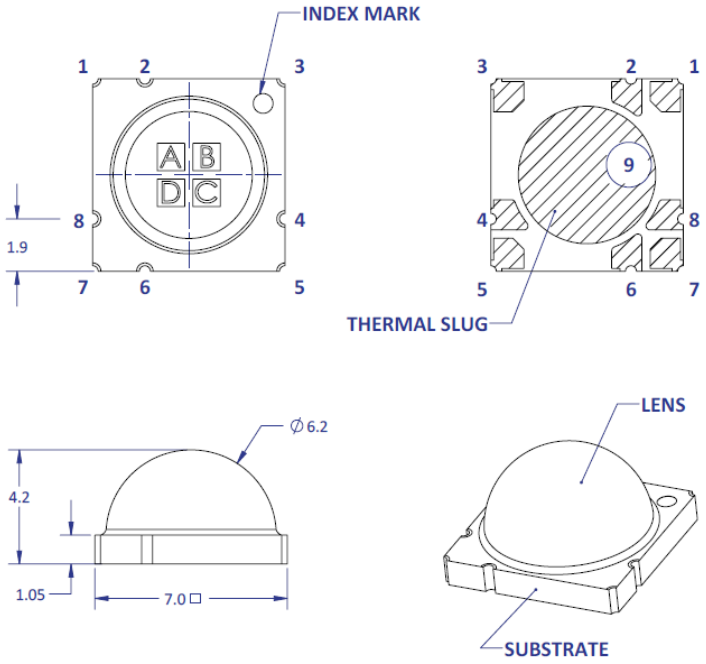
Average Lumen Maintenance Projections

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.

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Mechanical Dimensions (mm)



Pin Out			
Pad	**Die**	**Color**	**Function**
1	A	Blue	Anode
2	A	Blue	Cathode
3	B	Red	Anode
4	B	Red	Cathode
5	C	Green	Anode
6	C	Green	Cathode
7	D	Amber	Anode
8	D	Amber	Cathode
9 [2]	n/a	n/a	Thermal

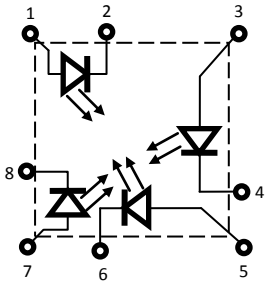


Figure 1: Package Outline Drawing.

Notes for Figure 1:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Thermal contact, Pad 9, is electrically neutral.

Recommended Solder Pad Layout (mm)

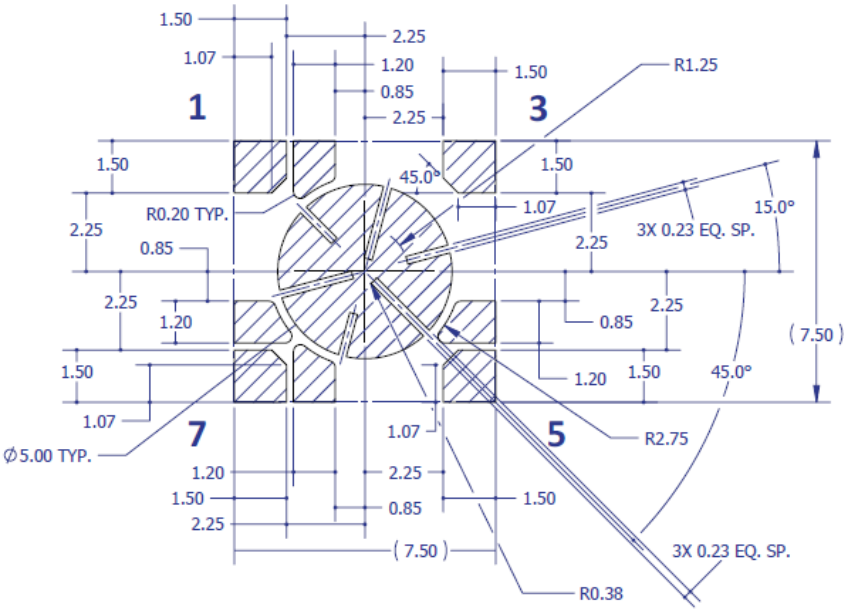


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad.

Note for Figure 2a:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. This pad layout is “patent pending”.

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Recommended Solder Mask Layout (mm)

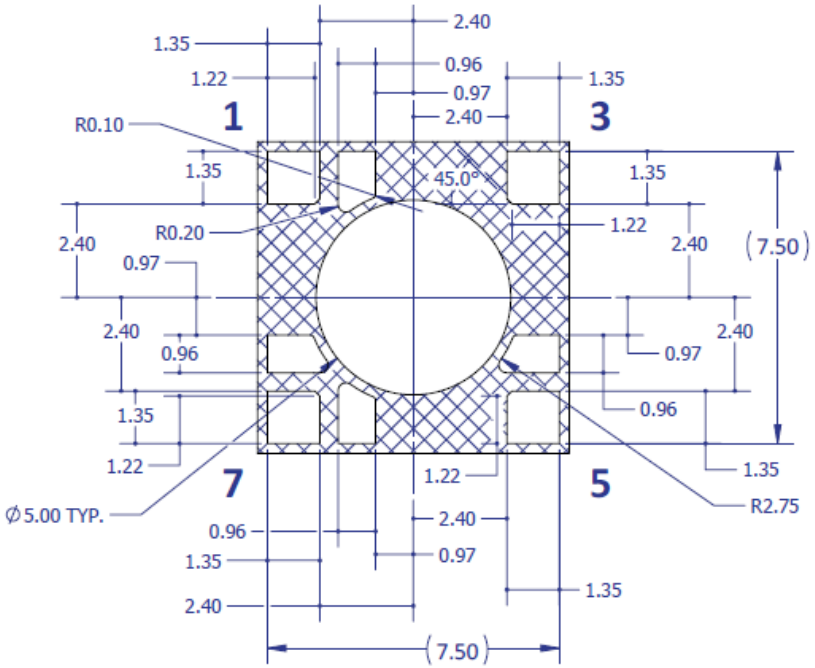


Figure 2b: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2b:

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

Reflow Soldering Profile

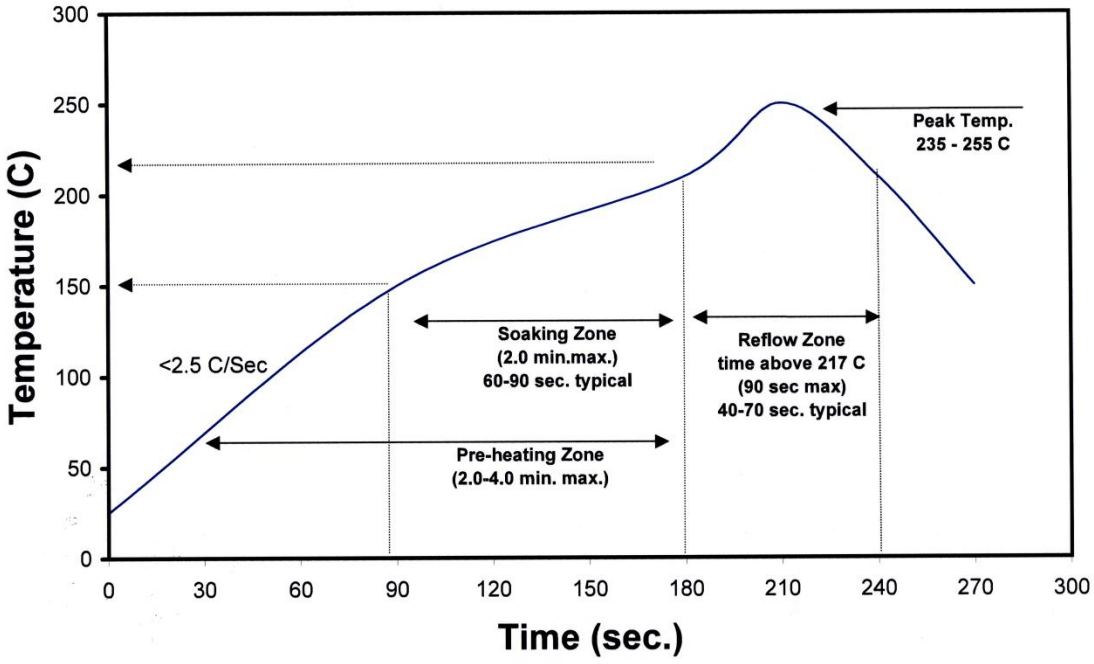


Figure 3: Reflow soldering profile for lead free soldering.

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Typical Radiation Pattern

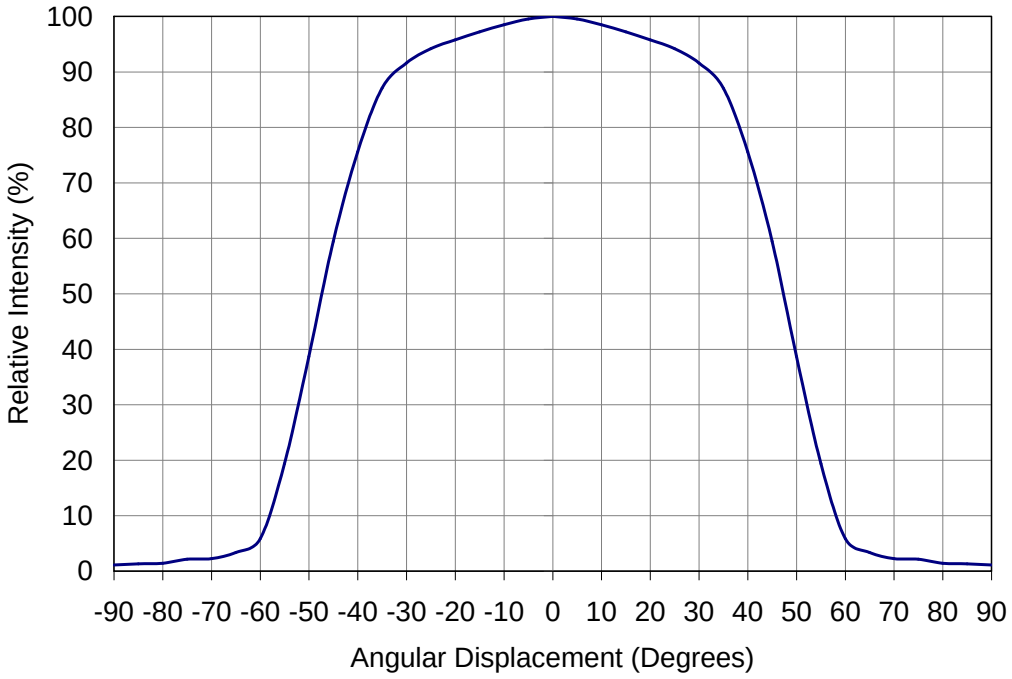


Figure 4: Typical representative spatial radiation pattern.

Typical Relative Spectral Power Distribution

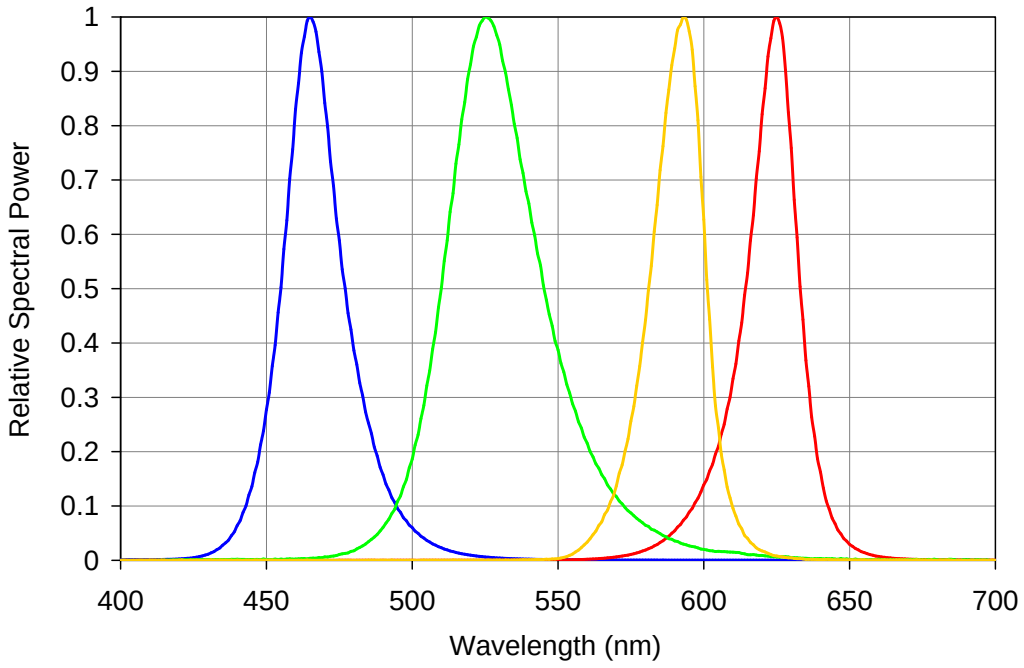


Figure 5: Typical relative spectral power vs. wavelength @ T_c = 25°C.

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Typical Dominant Wavelength Shift

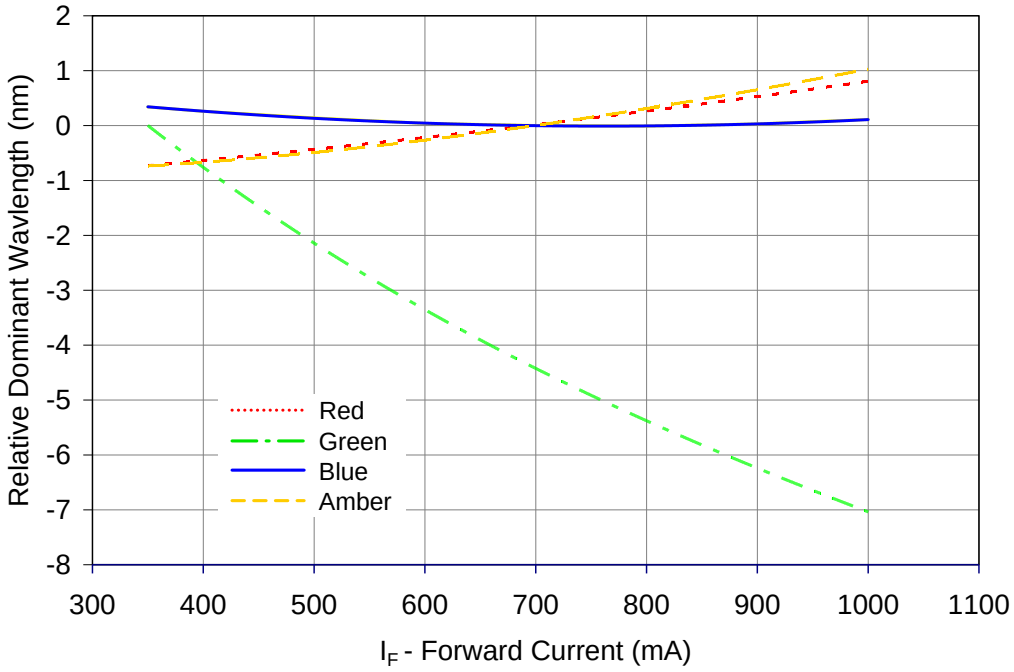


Figure 6: Typical dominant wavelength shift vs. forward current @ T_C = 25°C.

Notes for Figure 6:

1. Red, Blue and Amber dominant wavelength relative to I_F = 700mA.
2. Green dominant wavelength relative to I_F = 350mA.

Dominant Wavelength Shift over Temperature

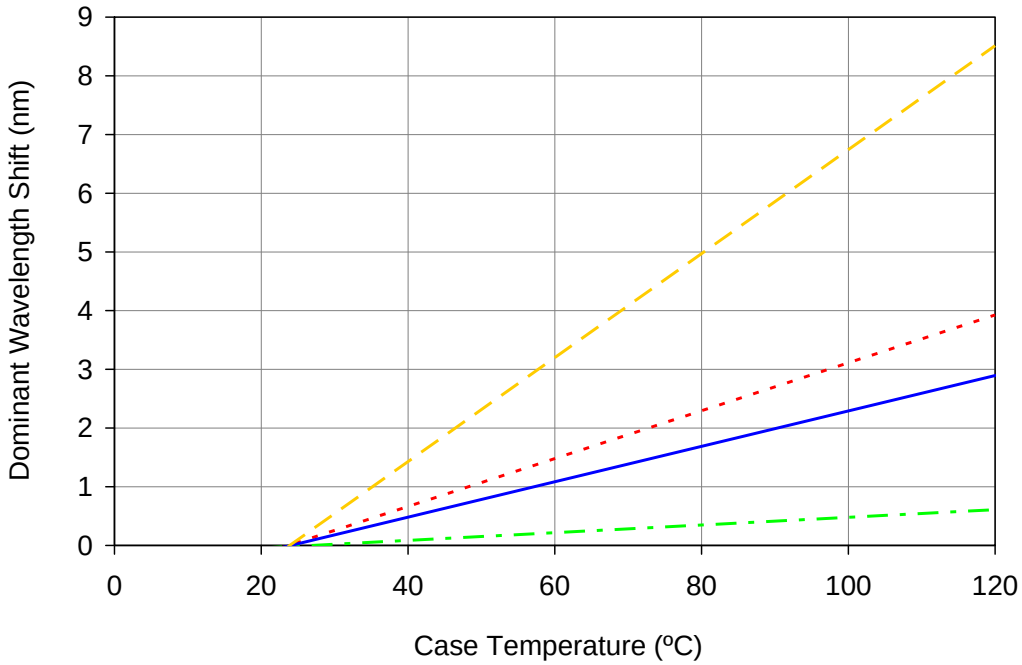


Figure 7: Typical dominant wavelength shift vs. case temperature.

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Typical Relative Light Output

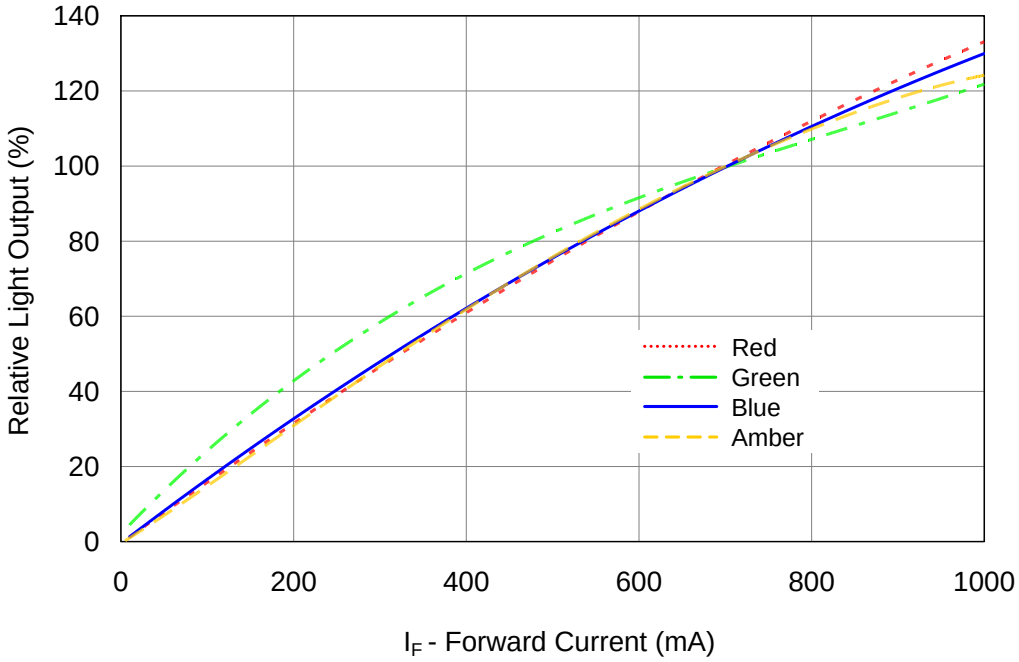


Figure 8: Typical relative light output vs. forward current @ T_C = 25°C.

Typical Relative Light Output over Temperature

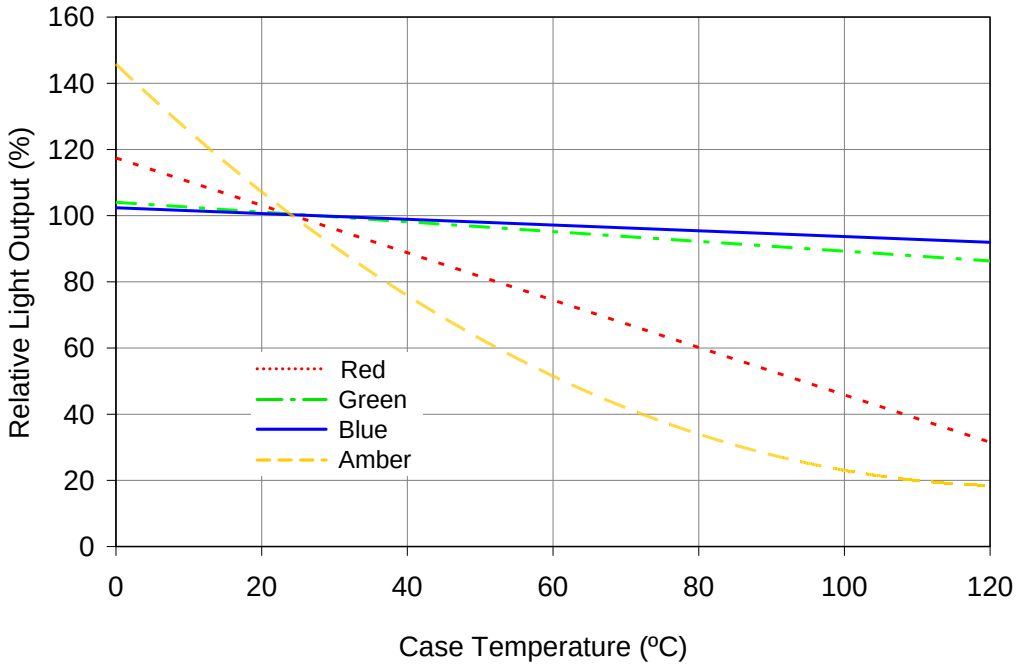


Figure 9: Typical relative light output vs. case temperature.

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Typical Forward Current Characteristics

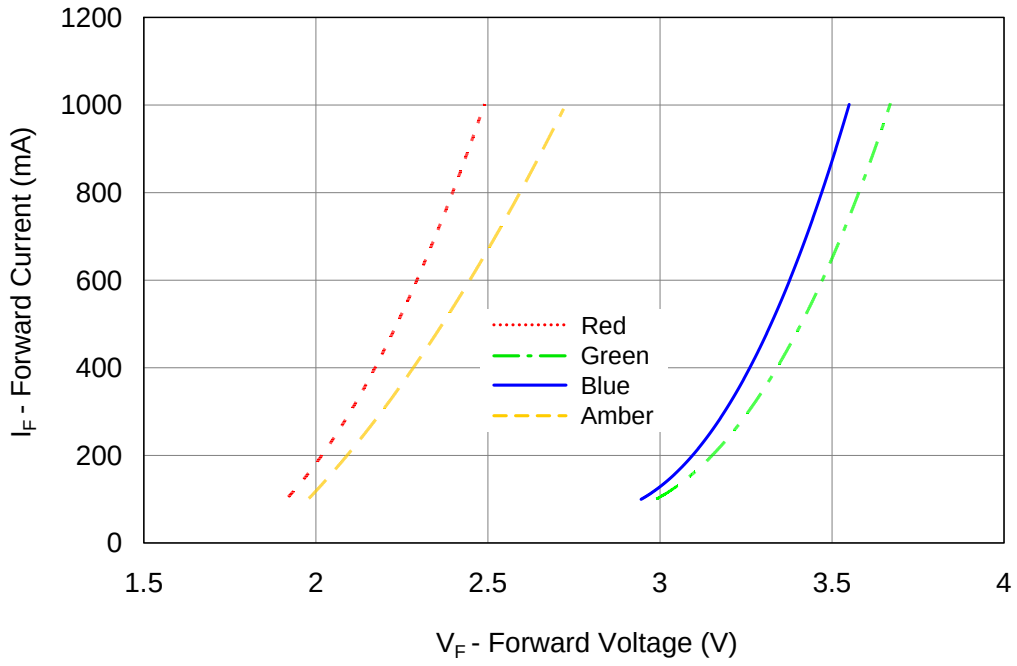


Figure 10: Typical forward current vs. forward voltage @ T_C = 25°C.

Current Derating

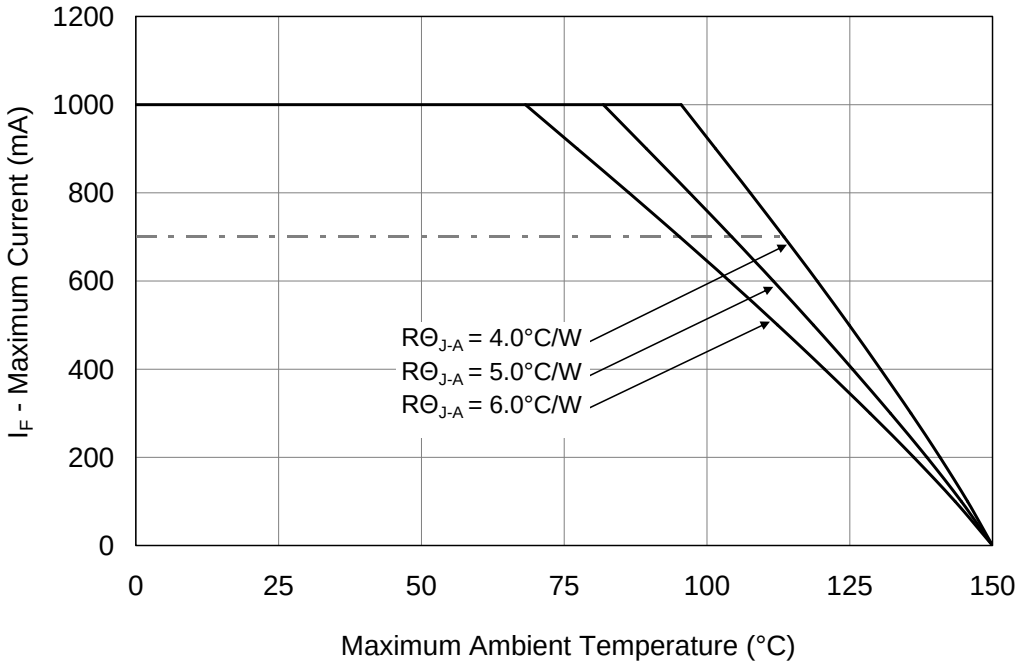


Figure 11: Maximum forward current vs. ambient temperature based on $T_{J(MAX)}$ = 150°C.

Notes for Figure 11:

3. Maximum current assumes that all four LED dice are operating concurrently at the same current.
4. $R\Theta_{J-C}$ [Junction to Case Thermal Resistance] for the LZ4-00MA00 is typically 1.1°C/W.
5. $R\Theta_{J-A}$ [Junction to Ambient Thermal Resistance] = $R\Theta_{J-C}$ + $R\Theta_{C-A}$ [Case to Ambient Thermal Resistance].

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Emitter Tape and Reel Specifications (mm)

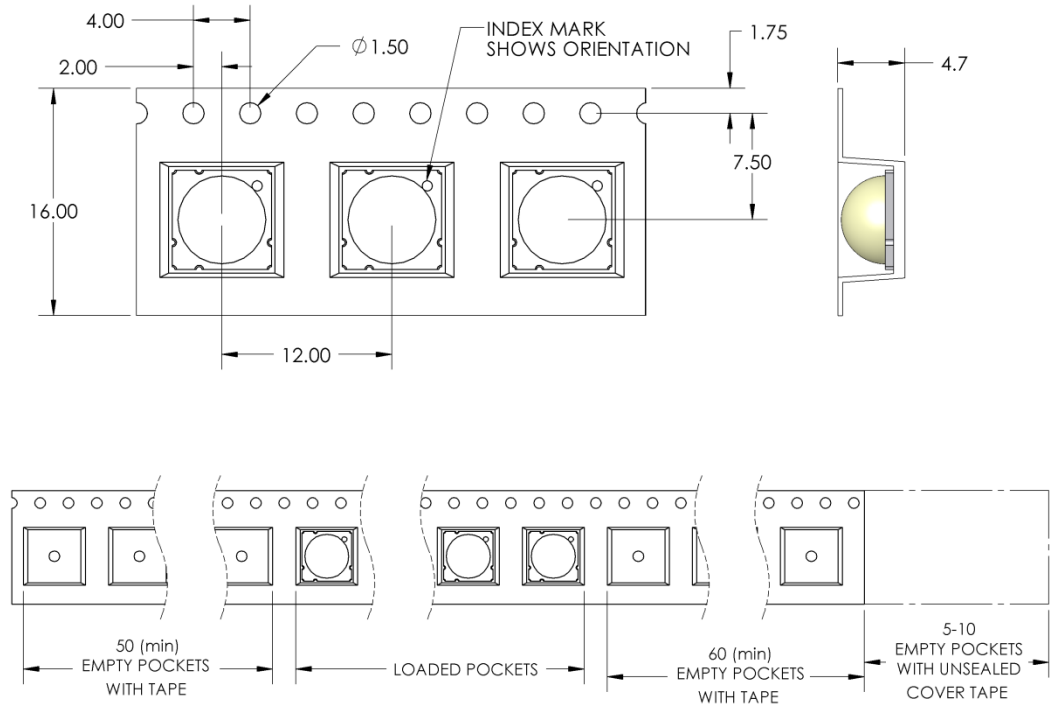


Figure 12: Emitter carrier tape specifications (mm).

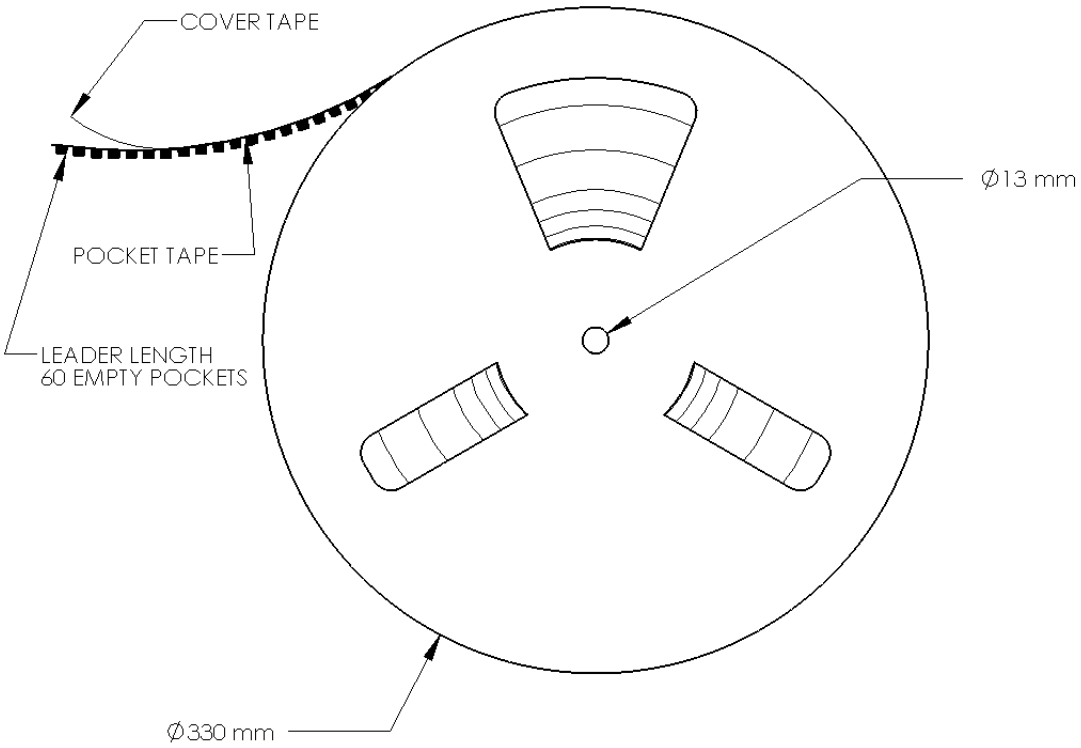


Figure 13: Emitter reel specifications (mm).

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LZ4 MCPCB Family

Part number	Type of MCPCB	Diameter (mm)	Emitter + MCPCB Thermal Resistance (°C /W)	Typical V_f (V)	Typical I_f (mA)
LZ4-2xxxxx	4-channel	19.9	1.1 + 1.1 = 2.2	2.2 – 3.5	700

Mechanical Mounting of MCPCB (Also save to MCPCB main file)

- MCPCB bending should be avoided as it will cause mechanical stress on the emitter, which could lead to substrate cracking and subsequently LED dies cracking.
- To avoid MCPCB bending:
  - Special attention needs to be paid to the flatness of the heat sink surface and the torque on the screws.
  - Care must be taken when securing the board to the heat sink. This can be done by tightening three M3 screws (or #4-40) in steps and not all the way through at once. Using fewer than three screws will increase the likelihood of board bending.
  - It is recommended to always use plastics washers in combinations with the three screws.
  - If non-taped holes are used with self-tapping screws, it is advised to back out the screws slightly after tightening (with controlled torque) and then re-tighten the screws again.

Thermal interface material

- To properly transfer heat from LED emitter to heat sink, a thermally conductive material is required when mounting the MCPCB on to the heat sink.
- There are several varieties of such material: thermal paste, thermal pads, phase change materials and thermal epoxies. An example of such material is Electrolube EHTC.
- It is critical to verify the material's thermal resistance to be sufficient for the selected emitter and its operating conditions.

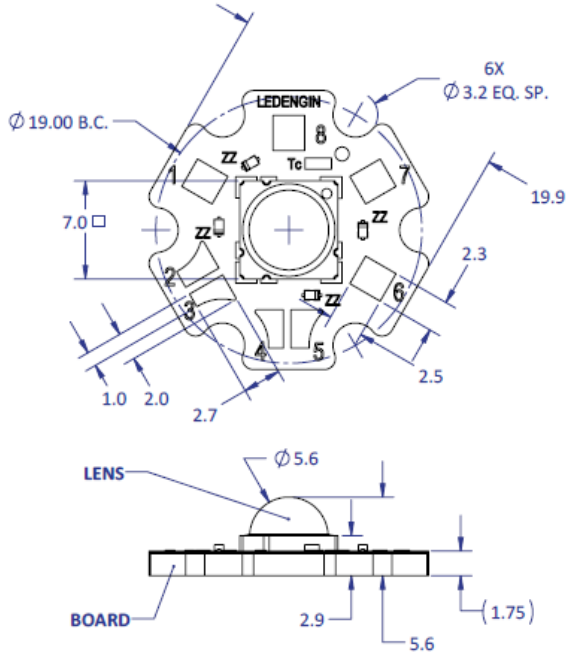
Wire soldering

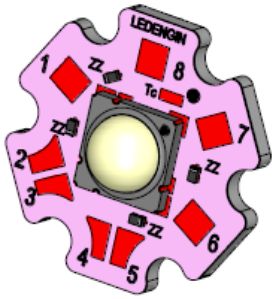
- To ease soldering wire to MCPCB process, it is advised to preheat the MCPCB on a hot plate of 125-150^{o}C. Subsequently, apply the solder and additional heat from the solder iron will initiate a good solder reflow. It is recommended to use a solder iron of more than 60W.
- It is advised to use lead-free, no-clean solder. For example: SN-96.5 AG-3.0 CU 0.5 #58/275 from Kester (pn: 24-7068-7601)

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LZ4-2xxxxx

4 channel, Standard Star MCPCB (4x1) Dimensions (mm)





Notes:

- Unless otherwise noted, the tolerance = ± 0.2 mm.
- Slots in MCPCB are for M3 or #4-40 mounting screws.
- LED Engin recommends 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 heatsink.
- The thermal resistance of the MCPCB is: RθC-B 1.1°C/W

Components used

MCPCB: HT04503 (Bergquist)
ESD chips: BZT52C5-C10 (NPX, for 1 LED die)

Pad layout			
Ch.	**MCPCB Pad**	**String/die**	**Function**
1	1	1/A	Anode +
	8		Cathode -
2	7	2/B	Anode +
	6		Cathode -
3	5	3/C	Anode +
	4		Cathode -
4	3	4/D	Anode +
	2		Cathode -

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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.

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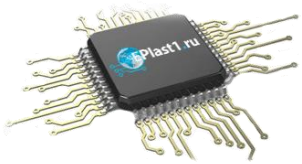
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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