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PRELIMINARY

LuxiGen Horticulture Emitter Series
LZP Multi-Wavelength Horticulture LED Emitter



LZP-00H100



Key Features

- Ultra-high Photosynthetic Photon Flux (PPF) surface mount ceramic package LED with integrated glass lens
- Blue 450nm, Deep Red 660nm, Far Red 740nm and Green 520nm in a single LED package for optimum overall plant growth
- 70W power dissipation in a compact 12.0mm x 12.0mm emitter footprint
- Industry lowest thermal resistance per package footprint (0.5°C/W)
- In-source mixing based on smart die positioning for optimum wavelength uniformity
- Electrically neutral thermal path
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Emitter available on 4-channel Star and Connectorized MCPCB (optional)
- Full suite of TIR secondary optics family available

Typical Applications

- Horticulture lighting

Description

The LZP-00H100 horticulture LED emitter incorporates multiple wavelengths critical for optimum plant growth: Blue 450nm, Deep Red 660nm, Far Red 740nm and Green 520nm. From a compact 12.0mm x 12.0mm footprint, it produces an ultra-high Photosynthetic Photon Flux (PPF) value of 106 μ mol/s, maximizing the Photosynthetic Photon Flux Density (PPFD) in a given area. The emitter's smart die positioning pre-mixes the colors in the emitter level for optimum wavelength uniformity on the plant surface. The ultra-low thermal resistance of the package dissipates 70W of heat efficiently resulting in excellent flux output and flux maintenance over time. The glass primary lens and other high quality materials used in the package are designed to deliver monumental robustness in challenging grow environment with high ambient temperature and humidity.

Part Number Options

Base part number

Part number	Description
LZP-00H100-xxxx	LZP Horticulture emitter
LZP-L0H100-xxxx	LZP Horticulture emitter on 4 channel Star MCPCB
LZP-W0H100-xxxx	LZP Horticulture emitter on 4 channel Connectorized MCPCB

Bin kit option codes:

H1, Horticulture			
Kit number suffix	Min flux Bin	Color Bin Ranges	Description
0000			Full distribution flux; full distribution wavelength

Notes:

1. Default bin kit option is -0000

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	T_J	125	°C
Soldering Temperature ^[4]	T_{sol}	260	°C

Notes for Table 4:

- Maximum DC forward current is determined by the overall thermal resistance and ambient temperature. Follow the curves in Figure 11 for current derating.
- 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.
- LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZP-00H100 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

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

Table 5:

Parameter	Symbol	Typical				Total	Unit
		8 Deep Red	4 Far Red	8 Blue ^[1]	4 Green		
PPF 280-800nm (@ $I_F = 700\text{mA}$)		33	13	25	6	77	umol/s
PPF 280-800nm (@ $I_F = 1000\text{mA}$)		46	19	33	8	106	umol/s
Radiant Flux (@ $I_F = 700\text{mA}$)	Φ	5.4	1.9	7.7	1.3	16.3	W
Radiant Flux (@ $I_F = 1000\text{mA}$)	Φ	7.6	2.7	10.3	1.6	22.2	W
Peak Wavelength	λ_p	660	740	450	520		nm
Viewing Angle ^[2]	$2\theta_{\frac{1}{2}}$			125			Degrees
Total Included Angle ^[3]	$\theta_{0.9}$			140			Degrees

Notes for Table 5:

- When operating the Blue LED, observe IEC 62471 Risk Group 2 rating. Do not stare into the beam.
- Viewing Angle is the off axis angle from emitter centerline where the luminous intensity is $\frac{1}{2}$ of the peak value.
- Total Included Angle is the total angle that includes 90% of the total luminous flux.

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

Table 6:

Parameter	Symbol	Typical				Unit
		8 Deep Red	4 Far Red	8 Blue	4 Green	
Forward Voltage (@ $I_F = 700\text{mA}$) ^[1]	V_F	18.8	8.2	25.6	14.4	V
Forward Voltage (@ $I_F = 1000\text{mA}$) ^[1]	V_F	20.0	8.8	26.4	15.0	V
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_J$	-36.8	-8.0	-16.0	-11.6	mV/°C
Thermal Resistance (Junction to Case)	$R\theta_{J-C}$			0.5		°C/W

Notes for Table 6:

- Forward Voltage typical value is for all LED dice from the same color dice connected in series.

IPC/JEDEC Moisture Sensitivity Level

Table 7 – IPC/JEDEC J-STD-20 MSL Classification:

Level	Soak Requirements					
	Floor Life		Standard		Accelerated	
	Time	Conditions	Time (hrs)	Conditions	Time (hrs)	Conditions
1	unlimited	≤ 30°C/ 60% RH	168 +5/-0	85°C/ 60% RH	n/a	n/a

Notes for Table 7:

- 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.

Mechanical Dimensions (mm)

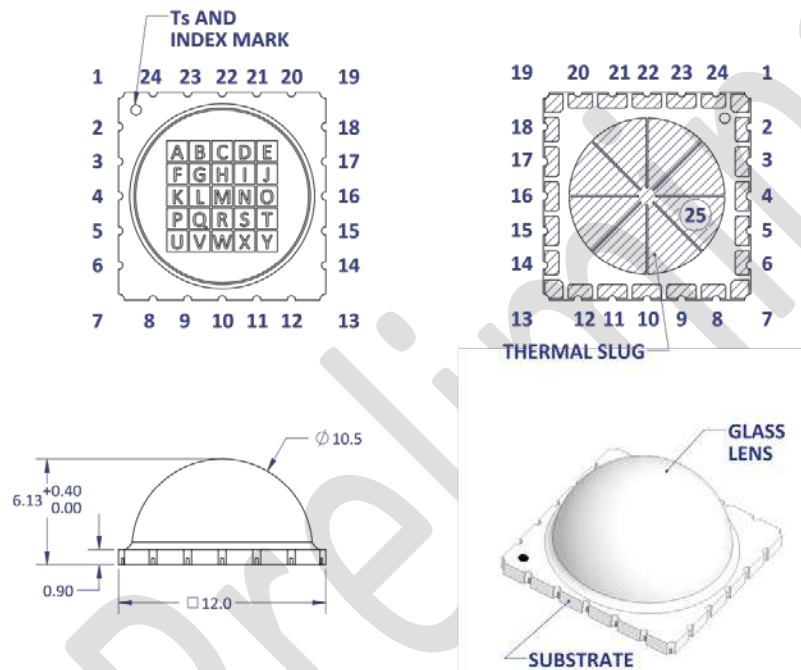


Figure 1: Package outline drawing.

Notes:

- Unless otherwise noted, the tolerance = ± 0.20 mm.
- Thermal slug is electrically isolated
- Ts is a thermal reference point

Pin Out				
Ch.	Pad	Die	Color	Function
1	18	B	Deep Red	Anode +
		I	Deep Red	na
		K	Deep Red	na
		R	Deep Red	na
		T	Far Red	na
2	2	U	Far Red	Cathode -
	17	E	Blue	Anode +
		F	Blue	na
		H	Blue	na
		O	Blue	na
3	3	X	Green	Cathode -
	15	A	Deep Red	Cathode -
		C	Deep Red	na
		J	Deep Red	na
		L	Deep Red	na
4	5	V	Far Red	Anode +
	14	D	Blue	Anode +
		G	Blue	na
		M	Blue	na
		N	Blue	na
		P	Green	na
6	Y	Green	na	
6	Y	N/A	Cathode -	

DNC pins: 1,4,7,8,9,10,11,12,13,16,19,20,21,22,23,24.

Note:

DNC = Do Not Connect (Electrically Non Isolated)

Typical Relative Spectral Power Distribution

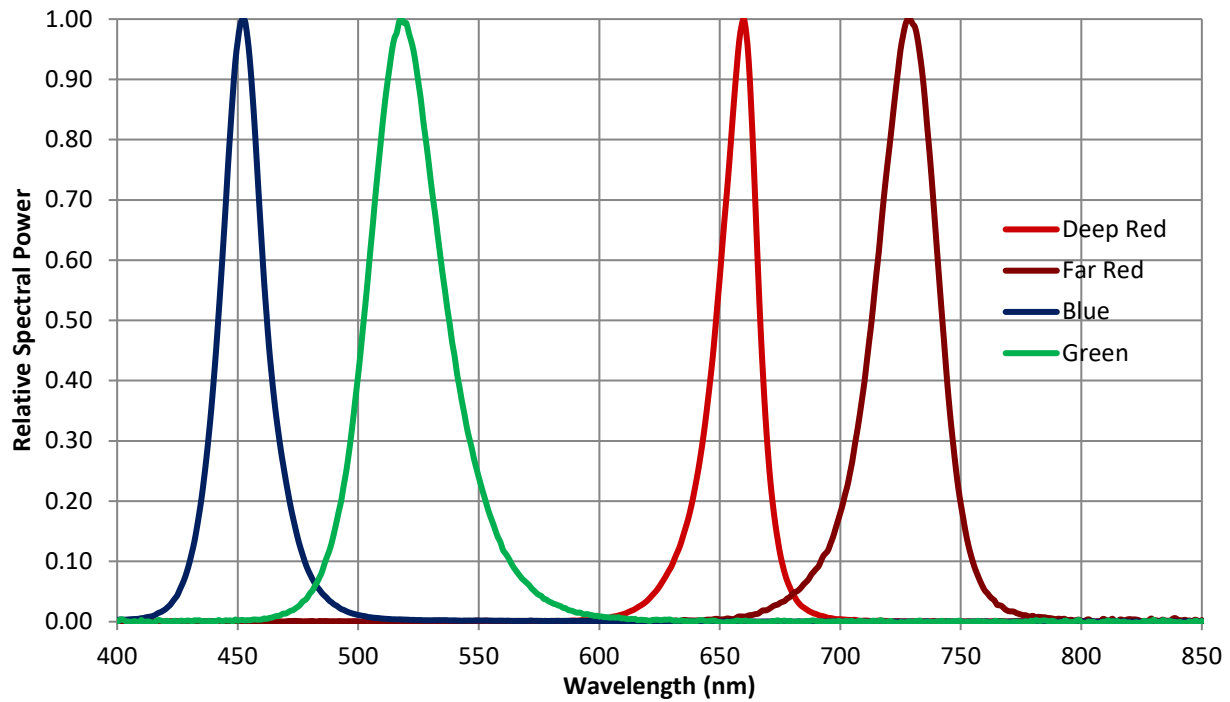


Figure 5: Typical relative spectral power vs. wavelength @ T_c = 25°C.

Typical Radiation Pattern

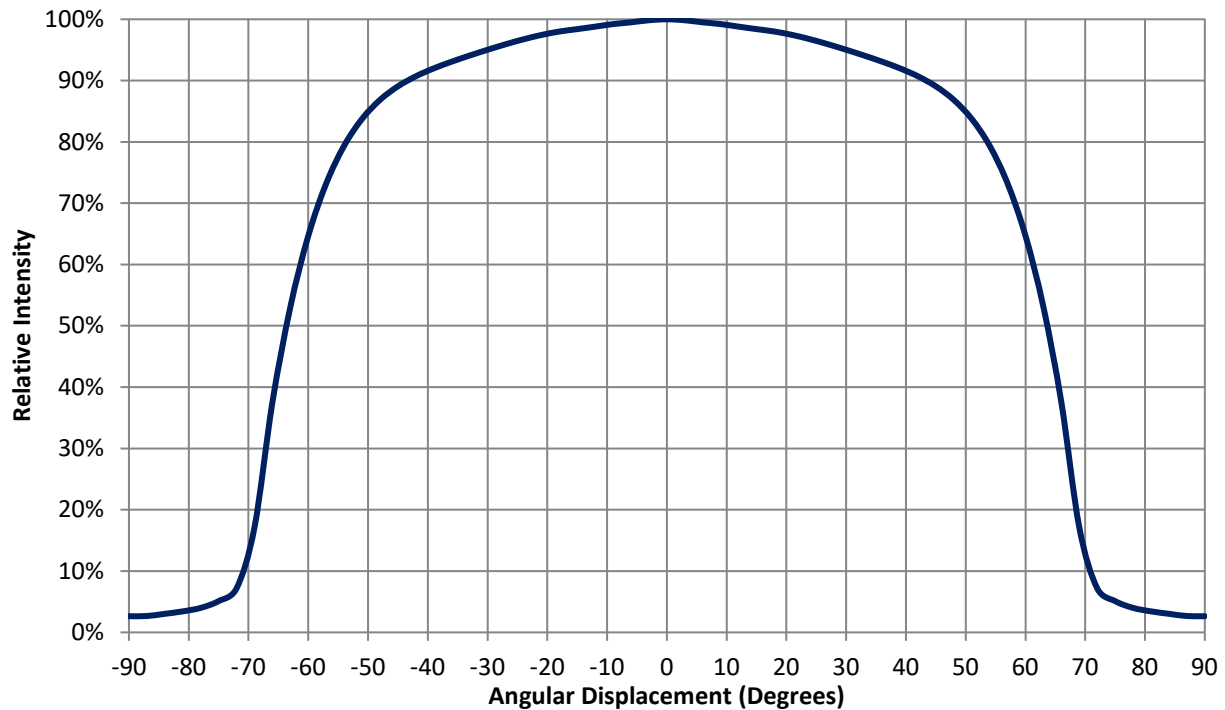
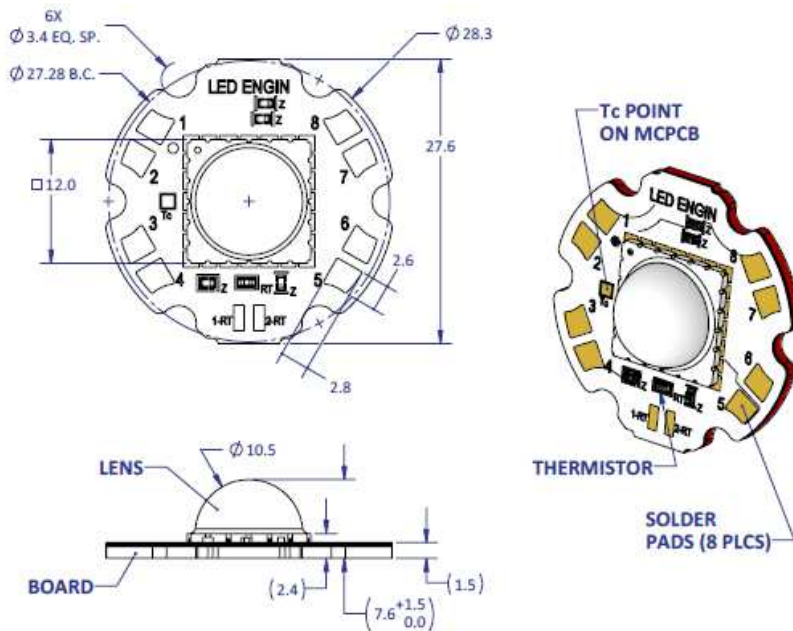


Figure 4: Typical representative spatial radiation pattern

LZP-Lxxxxx

4-Channel MCPCB Mechanical Dimensions (mm)



Note:

- Unless otherwise noted, the tolerance = ± 0.20 mm.
- Slots in MCPCB are for M3 or #4-40 mounting screws.
- The thermal resistance of the MCPCB is: $R_{\theta C-B}$ 0.1°C/W

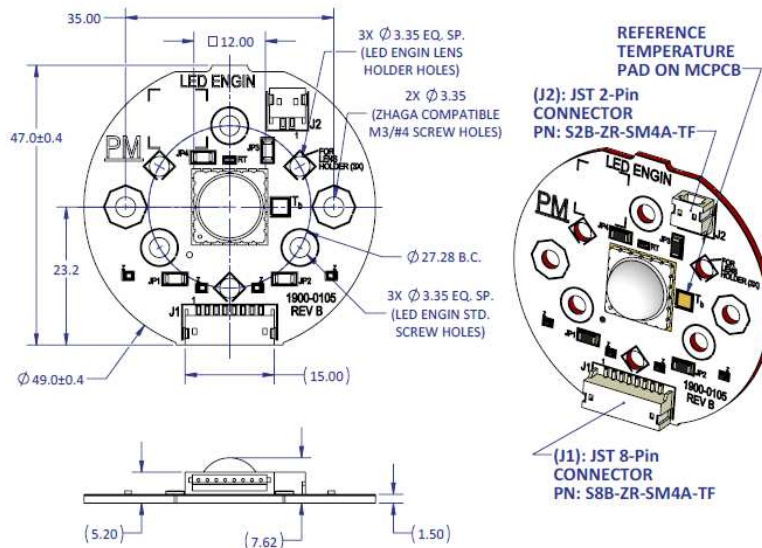
Components used

MCPCB:	MHE-301 copper	(Rayben)
ESD chips:	BZX884-B39	(NXP, for 6-7 LED dies in series)
NTC:	NCP15XH103F03RC	(Murata)

Pad layout			
Ch.	MCPCB Pad	String/die	Function
1 (D. Red + F. Red)	8	1/ BIKRTU	Anode + Cathode -
	1		
2 (Blue + Green)	7	2/ EFHOQX	Anode + Cathode -
	2		
3 (D. Red + F. Red)	3	3/ ACJLSV	Anode + Cathode -
	6		
4 (Blue + Green)	5	4/ DGMNPWY	Anode + Cathode -
	4		
NTC	1-RT	10kohm NTC	NTCA
	2-RT		NTCB

LZP-Wxxxxx

4-Channel 50mm Connectorized MCPCB Mechanical Dimensions (mm)



Note:

- Unless otherwise noted, the tolerance = ± 0.20 mm.
- Mating connector: ZHR-8 (JST) for the 8-pin connector and ZHR-2 (JST) for the 2-pin connector. It is recommended to strain relief the mating connector.
- LED Engin standard screw refers to M3 or #4-40 screw.
- The thermal resistance of the MCPCB is: RθC-B 0.1°C/W

Components used

MCPCB:	MHE-301 copper	(Rayben)
Connectors ¹ :	S8B-ZR-SM4A-TF	(JST)
	S2B-ZR-SM4A-TF	(JST)
Jumper:	RC1206JR-070RL	(Yageo)
ESD/TVS diode:	SPHV36-01ETG	(Littelfuse)
Thermistor:	NCP15XH103F03RC	(Murata)

Note:

1. Max connector temp is 105°C.

MCPCB Pin-Out (at J1 connector)			
Ch.	Connector Pin	String/die	Function
1 (D. Red + F. Red)	1	1/	Anode +
	2	BIKRTU	Cathode -
2 (Blue + Green)	3	2/	Anode +
	4	EFHOQX	Cathode -
3 (D. Red + F. Red)	5	3/	Anode +
	6	ACJLSV	Cathode -
4 (Blue + Green)	8	4/	Anode +
	7	DGMNPWY	Cathode -

MCPCB Pin-Out (at J2 connector)			
Ch.	Connector Pin	String	Function
NTC	1	10kohm NTC	NTCA
	2		NTCB

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.