power light source

Warm White Luxeon™ Emitter & Star

Technical Data

Luxeon warm white LEDs are the first to deliver the high quality light required by lighting designers and architects for interior and exterior applications. With a nominal correlated color temperature (CCT) of 3200K and a typical color rendering index (CRI R_a) of 90, Luxeon warm white light sources deliver light that is superior or equivalent to conventional light sources.

Warm white Luxeon is available in both Star and Emitter configurations. The configuration and radiation pattern offerings provide design flexibility in a package that has already been field proven for reliability, durability and dependability.

Lumileds' revolutionary warm white technology is specifically designed to meet the needs of architects, designers, specifiers and ultimately end-users and consumers.

Features

- 3200K nominal CCT spectral output, complimentary color temperature to conventional indoor light sources
- Typical CRI R_a value of 90 with high R_9 value, delivering superior color rendering compared to other solid-state light sources
- Highest flux per LED in the world
- Very long operating life (up to 100k hours)
- Low voltage DC operated
- Cool beam, safe to the touch
- Instant light (less than 100 ns)
- Fully dimmable
- No UV or IR in light beam
- Superior ESD protection

Typical Applications

- Hospitality lighting (retail / shop, restaurant and hotel)
- Museum lighting
- Display case / cabinet lighting
- Task / accent lighting
- Cove lighting
- Architectural detail / city beautification
- Reading lights (car, bus, aircraft)

LUXEON™

Warm White Luxeon Part Number Matrix

Part Number	Beam Pattern	Configuration	Drive Current
LXHL-BW03	Batwing	Emitter	350 mA
LXHL-MWGC	Batwing	Star	350 mA
LXHL-NWG8	Batwing	Star/O	350 mA

Color Characteristics at 350mA, Junction Temperature, T_J = 25°C

Part Number	Color Rendering Index R_a	Color Temperature[2] CCT		
	Typ.	Min.	Typ.	Max.
LXHL-BW03	90[1]	2850 K	3300 K	3800 K
LXHL-MWGC	90[1]	2850 K	3300 K	3800 K
LXHL-NWG8	90[1]	2850 K	3300 K	3800 K

Notes:
1. The typical R_9 value for warm white Luxeon products is 70.
2. Correlated Color Temperature (CCT) ± 5% tester tolerance.

Flux Characteristics at 350mA, Junction Temperature, T_J = 25°C

Part Number	Configuration	Radiation Pattern	Minimum Luminous Flux (lm) Φ_V[1]	Typical Luminous Flux (lm) Φ_V[3]
LXHL-BW03	Emitter	Batwing	13.9	20
LXHL-MWGC	Star	Batwing	13.9	20
LXHL-NWG8	Star/O[2]	Collimated	11.8	17

Notes:
1. Minimum luminous flux or performance guaranteed within published operating conditions. Lumileds maintains a tolerance of ± 10% on flux measurements.
2. The efficiency of collimating optics is approximately 85%.
3. Luxeon types with even higher luminous flux levels will become available in the future. Please consult your Lumileds Authorized Distributor or Lumileds sales representative for more information.

Flux Characteristics of 5500K Luxeon at 350mA, Junction Temperature, T_J = 25°C

Part Number	Color Temperature	Configuration	Radiation Pattern	Typical Luminous Flux (lm) Φ_V[3]
LXHL-BW02[1]	5500 K	Emitter	Batwing	25
LXHL-PW01[1]	5500 K	Emitter	Lambertian	25
LXHL-DW01[1]	5500 K	Emitter	Side Emitting	25
LXHL-MWEC[1]	5500 K	Star	Batwing	25
LXHL-MW1D[1]	5500 K	Star	Lambertian	25
LXHL-FW1C[1]	5500 K	Star	Side Emitting	22
LXHL-NWE8[1]	5500 K	Star/O[2]	Collimated	22
LXHL-MWEA[1]	5500 K	Star/C	Batwing	25
LXHL-MW1B[1]	5500 K	Star/C	Lambertian	25

Notes:
1. 5500K Luxeon product data shown for reference only. For more detailed information on these products please consult Technical Data Sheets DS23 and DS25 for Star and Emitter products, respectively.
2. The efficiency of collimating optics is approximately 85%.
3. Luxeon types with even higher luminous flux levels will become available in the future. Please consult your Lumileds Authorized Distributor or Lumileds sales representative for more information.

Optical Characteristics at 350mA, Junction Temperature, T_J = 25°C, Continued

Part Number	Configuration	Total included angle[1] (degree) $\theta_{0.90V}$	viewing angle[2] (degree) 2θ 1/2	typical candela on axis[3] (cd)
LXHL-BW03	Emitter	110	110	N/A
LXHL-MWGC	Star	110	110	N/A
LXHL-NWG8	Star/O	25	10	200

Notes:
1. Total angle at which 90% of total luminous flux is captured.
2. θ½ is the off axis angle from lamp centerline where the luminous intensity is ½ of the peak value.
3. Typical Candela value listed for collimated Star/O product only.
4. All products built with Indium Gallium Nitride (InGaN).

Electrical Characteristics at 350mA, Junction Temperature, T_J = 25°C

Part Number	Forward Voltage V_F (V)[1] Min.	Typ.	Max.	Dynamic resistance[2] (Ω) R_D	Temperature coefficient of forward voltage[3] (mV/°C) $\Delta V_F / \Delta T_J$	Thermal resistance, junction to case (°C/W) $R\theta_{J-C}$
LXHL-BW03	2.79	3.42	3.99	1.0	-2.0	15

Notes:
1. Lumileds maintains a tolerance of ± 0.06V on forward voltage measurements.
2. Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs. See Figures 3a and 3b.
3. Measured between 25°C ≤ TJ ≤ 110°C at I_F = 350mA.

Electrical Characteristics at 350mA, Junction Temperature, T_J = 25°C, Continued

Part Number	Forward Voltage V_F (V)[1] Min.	Typ.	Max.	Dynamic resistance[2] (Ω) R_D	Temperature coefficient of forward voltage[3] (mV/°C) $\Delta V_F / \Delta T_J$	Thermal resistance, junction to board (°C/W) $R\theta_{J-B}$
LXHL-MWGC	2.79	3.42	3.99	1.0	-2.0	17
LXHL-NWG8	2.79	3.42	3.99	1.0	-2.0	17

Notes:
1. Lumileds maintains a tolerance of ± 0.06V on forward voltage measurements.
2. Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs. See Figures 3a and 3b.
4. Measured between 25°C ≤ TJ ≤ 110°C at I_F = 350mA.

Absolute Maximum Ratings - Emitter

Parameter	LXHL-BW03
DC Forward Current (mA) [1]	350
Peak Pulsed Forward Current (mA)	500
Average Forward Current (mA)	350
ESD Sensitivity [2]	± 16,000V HBM
LED Junction Temperature (°C)	120
Storage Temperature (°C)	-40 to +120
Soldering Temperature (°C) [3]	260 for 5 seconds max

Absolute Maximum Ratings – Star Products

Parameter	LXHL-MWGC	LXHL-NWG8
DC Forward Current (mA) [1]	350	350
Peak Pulsed Forward Current (mA)	500	500
Average Forward Current (mA)	350	350
ESD Sensitivity [2]	± 16,000V HBM	± 16,000V HBM
LED Junction Temperature (°C)	120	120
Aluminum-Core PCB Temperature (°C)[4]	105	105
Storage & Operating Temperature (°C)[5]	-40 to +105	-40 to +75

Light Output Characteristics

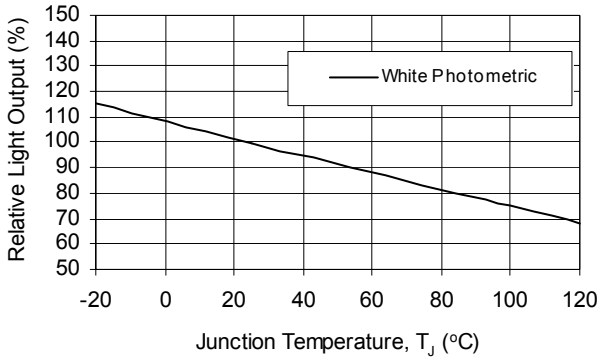


Figure 1.
Relative Light Output vs. Junction Temperature.

Notes: (for both tables)

1. Proper current derating must be observed to maintain junction temperature below the maximum. For more information, consult the Luxeon Design Guide, available upon request.
2. LEDs are not designed to be driven in reverse bias. Please consult Lumileds' application brief AB11 for further information.
3. Measured at leads, during lead soldering and slug attach, body temperature must not exceed 120°C. Luxeon emitters cannot be soldered by general IR or Vapor-phase reflow, nor by wave soldering. Lead soldering is limited to selective heating of the leads, such as by hot-bar reflow, fiber focussed IR, or hand soldering. The package back plane (slug) may not be attached by soldering, but rather with a thermally conductive adhesive. Electrical insulation between the slug and the board is required. Please consult Lumileds' Application Brief AB10 on Luxeon Emitter Assembly Information for further details on assembly methods.
4. Allowable MCPCB temperature to avoid exceeding maximum junction temperature at maximum V_f limit based on thermal resistance of Star assembly.
5. A reduction in maximum storage and operating temperature is required due to the acrylic optic.

Wavelength Characteristics, T_J = 25°C

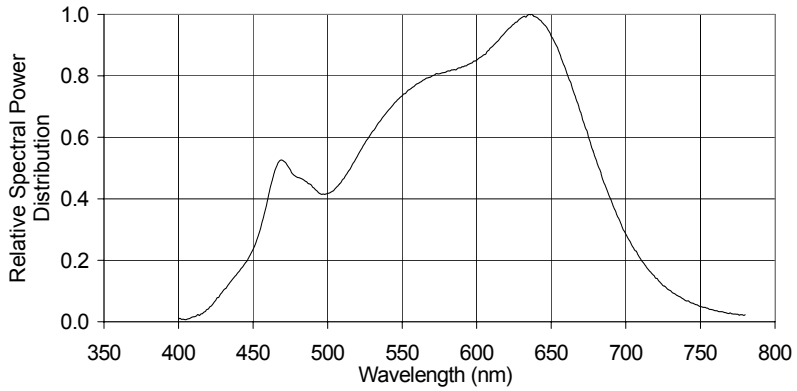


Figure 2a.
White Color Spectrum of Typical Warm White Part, Integrated Measurement.

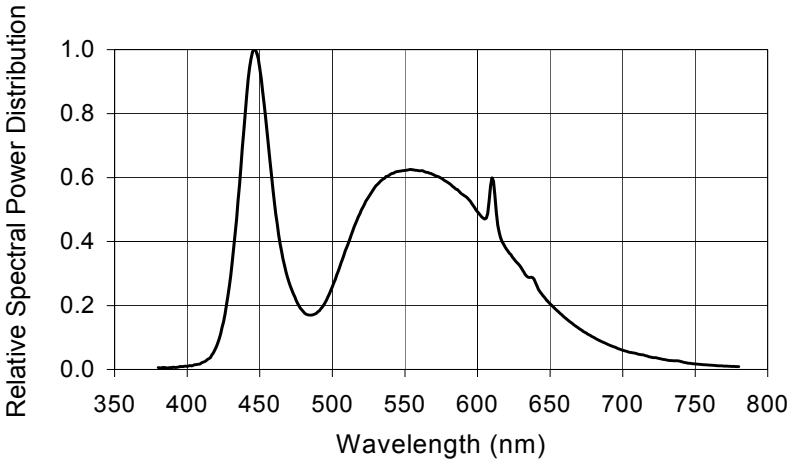


Figure 2b.
White Color Spectrum of Typical 5500K White Part, Integrated Measurement. Data shown for reference only. For more detailed information on these products please consult Technical Data Sheets DS23 and DS25 for Star and Emitter products, respectively.

Forward Current Characteristics, T_J = 25°C

Note:

Driving these high power devices at currents less than the test conditions may produce unpredictable results and may be subject to variation in performance. Pulse width modulation (PWM) is recommended for dimming effects.

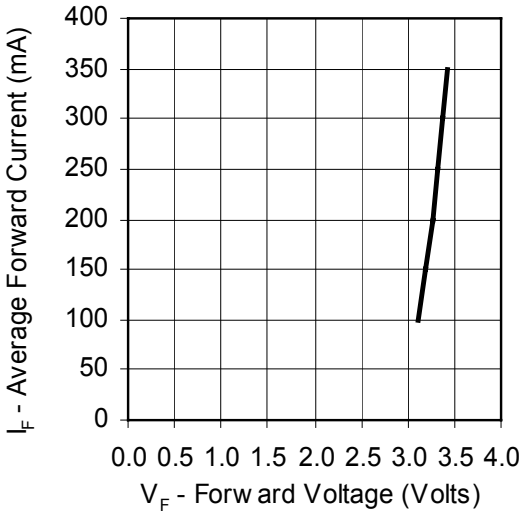


Figure 3a.
Forward Current vs. Forward Voltage.

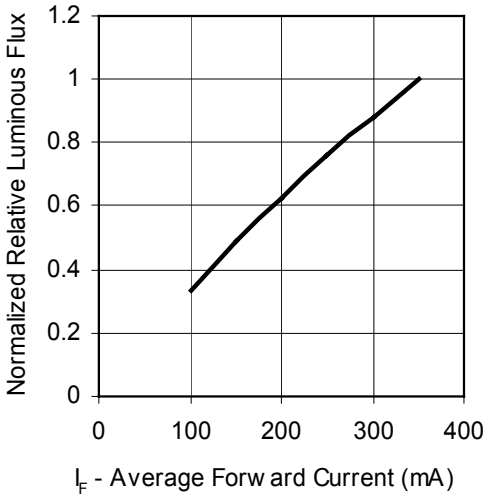


Figure 3b.
Relative Luminous Flux vs. Forward Current at T_j=25°C Maintained.

Current Derating Curves

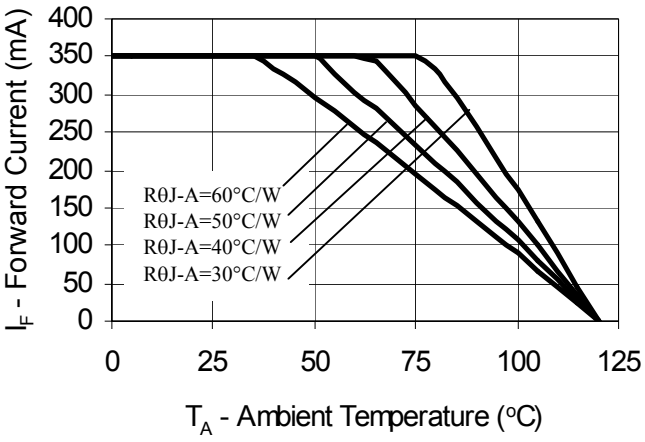


Figure 4a.
Maximum Forward Current vs. Ambient Temperature. Derating based on T_{JMAX} = 120 °C. Applicable for LXHL-BW03 and LXHL-MWGC.

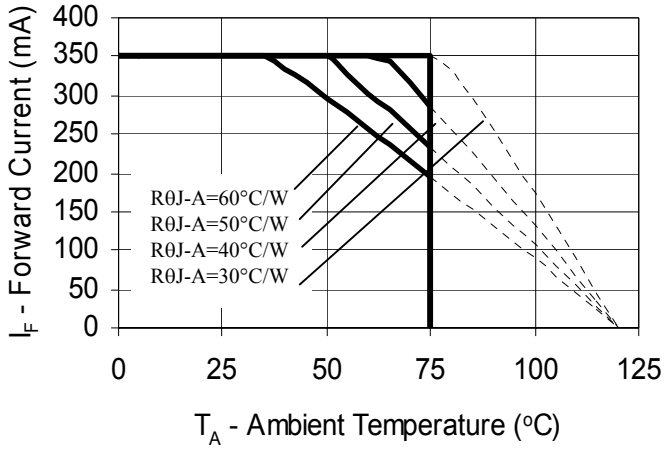
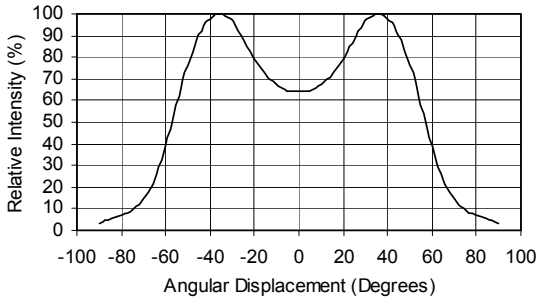


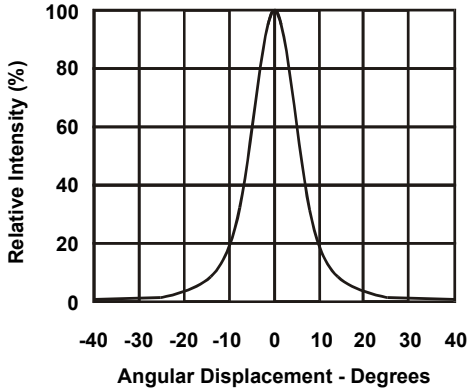
Figure 4b.
Maximum Forward Current vs. Ambient Temperature. Derating based on T_{JMAX} = 120 °C and $T_{AMBIENT\ MAX}$ = 75 °C for LXHL-NWG8.

Representative Spatial Radiation Pattern

Batwing Radiation Pattern



Radiation Pattern (with optics)



Note:
For more detailed technical information regarding Luxeon radiation patterns, please consult your Lumileds Authorized Distributor or Lumileds sales representative.

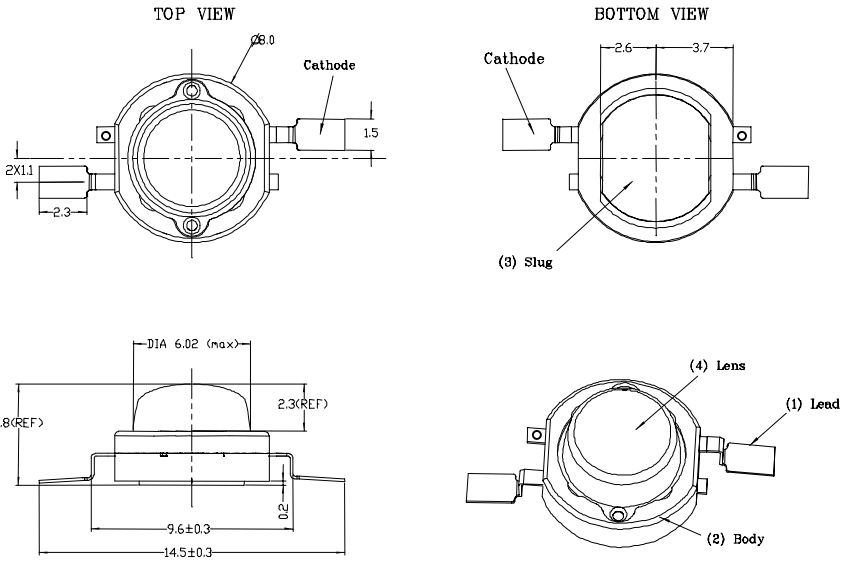
Figure 5.
Typical Representative Spatial Radiation Pattern for LXHL-BW03 and LXHL-MWGC.

Figure 6.
Typical Representative Spatial Radiation Pattern for LXHL-NWG8.

Average Lumen Maintenance Characteristics

Lifetime for solid-state lighting devices (LEDs) is typically defined in terms of lumen maintenance—the percentage of initial light output remaining after a specified period of time. Lumileds projects that Luxeon products will deliver on average 70% lumen maintenance at 50,000 hours of operation. This performance is based on independent test data, Lumileds historical data from tests run on similar material systems, and internal Luxeon reliability testing. This projection is based on constant current 350 mA operation with junction temperature maintained at or below 90°C. Observation of design limits included in this data sheet is required in order to achieve this projected lumen maintenance.

Mechanical Dimensions

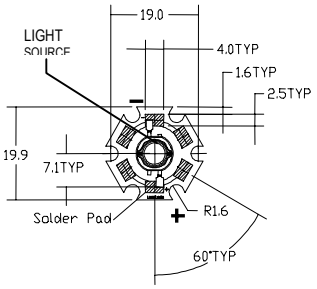


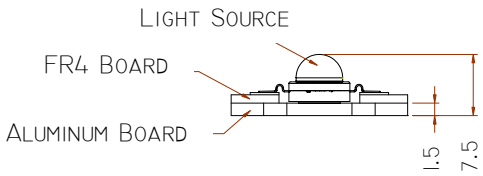
Emitter – LXHL-BW03

Notes:

1. The anode side of the device is denoted by a hole in the lead frame. Electrical insulation between the case and the board is required – slug of device is not electrically neutral. Do not electrically connect either the anode or cathode to the slug.
2. Drawings not to scale.
3. All dimensions are in millimeters.
4. All dimensions without tolerances are for reference only.

Luxeon Star





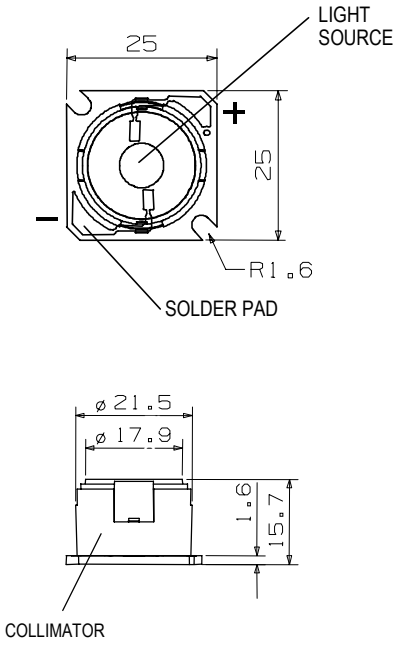
Star - LXHL-MWGC

Notes:

1. Slots in aluminum-core PCB for M3 or #4 mounting screw.
2. Electrical interconnection pads labeled on the aluminum-core PCB with "+" and "-" to denote positive and negative, respectively. All positive pads are interconnected, as are all negative pads, allowing for flexibility in array interconnection.
3. Electrical insulation between neighboring Stars is required - aluminum board is not electrically neutral.
4. Drawings not to scale.
5. All dimensions are in millimeters.

Mechanical Dimensions Continued

Luxeon Star/O



Star/O - LXHL-NWG8

Notes:

1. Slots in aluminum-core PCB for M3 or #4 mounting screw.
2. Positive solder pad is indicated by a copper dot next to the pad on the aluminum-core PCB.
3. The collimator is molded from optical grade acrylic. Do not subject to temperatures greater than 75°C, as plastic deformation may occur. Protect optic against exposure to solvents and adhesives that are not compatible with acrylic.
4. Drawings not to scale.
5. All dimensions are in millimeters.

Emitter Reel Packaging

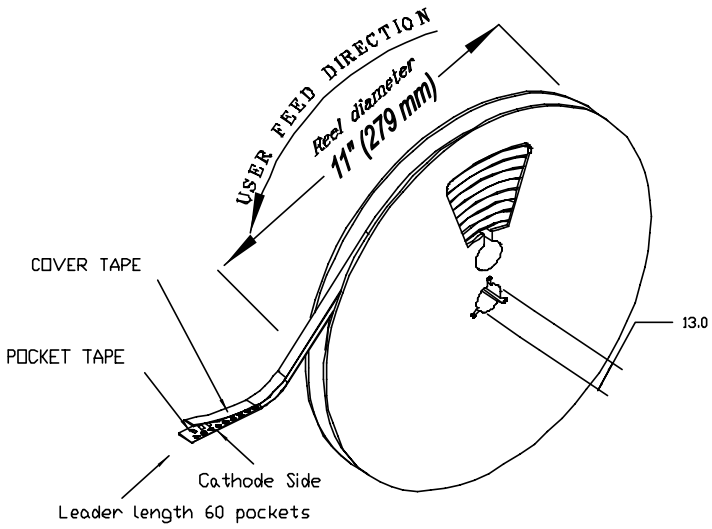
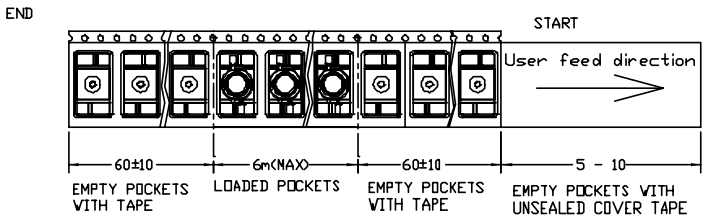


Figure 7.
Reel dimensions and orientation.



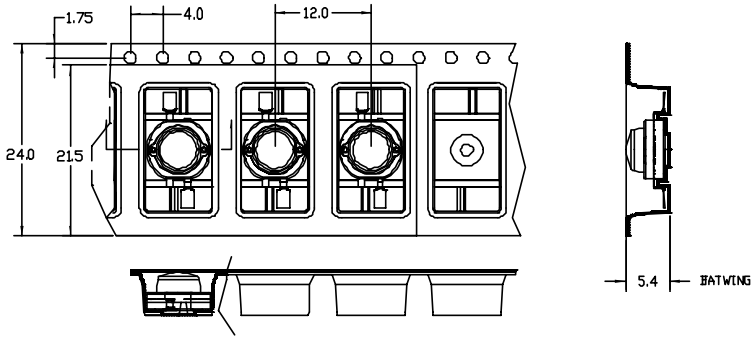


Figure 8.
Tape dimensions.

Notes:

1. Luxeon emitters should be picked up by the body (not the lens) during placement. The inner diameter of the pick-up collet should be greater than or equal to 6.5 mm. Please consult Lumileds' Application Brief AB10 on Luxeon Emitter assembly information for further details on assembly methods.
2. Drawings not to scale.
3. All dimensions are in millimeters.
4. All dimensions without tolerances are for reference only.

About Luxeon

Luxeon is the new world of solid-state lighting (LED) technology. Luxeon Power Light Source Solutions offer huge advantages over conventional lighting and huge advantages over other LED solutions. Luxeon enables partners to create and market products that, until now, were impossible to create. This means the opportunity to create products with a clear competitive advantage in the market. Products that are smaller, lighter, sleeker, cooler, and brighter. Products that are more fun to use, more efficient, and more environmentally conscious than ever before possible!

LUXEON™

Company Information

Luxeon is developed, manufactured and marketed by Lumileds Lighting, LLC. Lumileds is a world-class supplier of Light Emitting Diodes (LEDs) producing billions of LEDs annually. Lumileds is a fully integrated supplier, producing core LED material in all three base colors (Red, Green, Blue) and White. Lumileds has R&D development centers in San Jose, California and Best, The Netherlands. Production capabilities in San Jose, California and Malaysia.

Lumileds is pioneering the high-flux LED technology and bridging the gap between solid state LED technology and the lighting world. Lumileds is absolutely dedicated to bringing the best and brightest LED technology to enable new applications and markets in the Lighting world.

LUMILEDS™
LIGHT FROM SILICON VALLEY