

# power light source Luxeon™ Dental

## Technical Data DS35

Luxeon™ is a revolutionary, energy efficient and ultra compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting.

Luxeon Dental Solutions include both Luxeon and Luxeon V alternatives, offering both a low and high power-curing source. Luxeon Dental is available in either the emitter or star form, allowing flexibility in curing system design.

Luxeon Dental products are selected from the peak wavelength range most effective for short curing times, and are produced to elevated minimum power levels to deliver the powerful short wavelength blue power required to reduce curing times while enabling handheld curing wands.

This revolutionary new product line is specifically tailored to the dental curing industry to provide the source most effective for this application.



Luxeon Dental is available in radiometric dental blue.

### Features

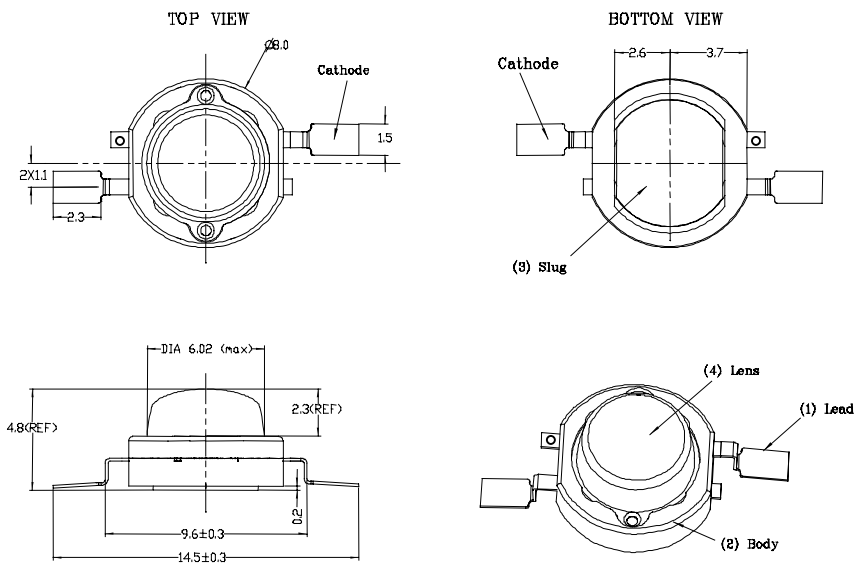
- Highest Flux per LED in the world
- Very long operating life (up to 100k hours)
- More Energy Efficient than Incandescent and most Halogen lamps
- Low voltage DC operated
- Cool beam, safe to the touch
- Instant light (less than 100 ns)
- Fully dimmable
- No UV
- Superior ESD protection

### Benefits

- Radiometric power levels and peak wavelength specifications matched to the response curves of many dental resins.
- Extreme radiometric power results in short curing times, <10 seconds for the Luxeon devices and on the order of 5 seconds for the Luxeon V devices.
- Low voltage DC operation allows for handheld cordless curing wand designs.
- Directed light from the source of the desired wavelength eliminates the need for inefficient color filters.
- Long life eliminates the need for bulb replacement



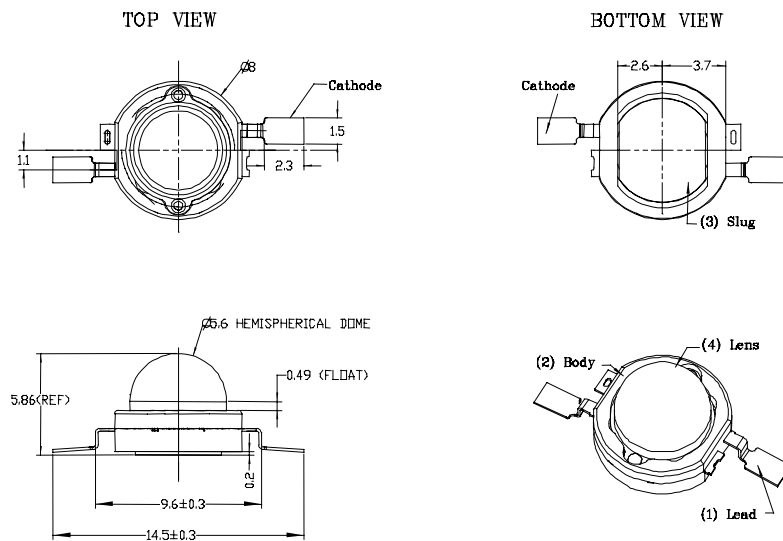
## Mechanical Dimensions - Emitter



### Batwing (Low Dome) – LXHL-BRD1

#### 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.



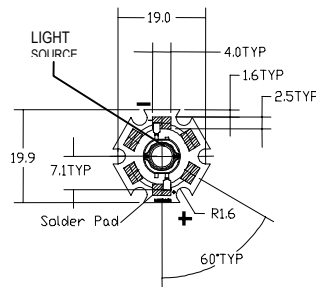
### Lambertian (High Dome) – LXHL-PRD5

#### Notes:

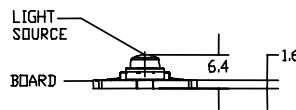
1. The anode side of the device is denoted by a hole in the lead frame. Electrical insulation between the case and the board is required – slug of device is not electrically neutral. Do not electrically connect either the anode or cathode to the slug.
2. Drawings not to scale.
3. All dimensions are in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

## Mechanical Dimensions - Star

### Luxeon Star



#### Batwing (Low Dome)

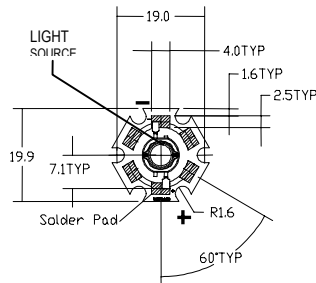


### LXHL-MRD1

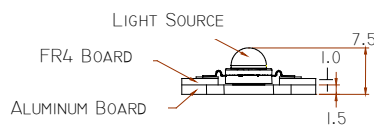
#### Notes:

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. Drawings not to scale.
4. All dimensions are in millimeters.

### Luxeon V Star



#### Lambertian (High Dome)



### LXHL-LRD5

#### 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.

## Part Number Matrix

| PART NUMBER | BEAM PATTERN | CONFIGURATION | PRODUCT TYPE | DRIVE CURRENT |
|-------------|--------------|---------------|--------------|---------------|
| LXHL-BRD I  | BATWING      | EMITTER       | LUXEON       | 350 mA        |
| LXHL-MRD I  | BATWING      | STAR          | LUXEON       | 350 mA        |
| LXHL-PRD5   | LAMBERTIAN   | EMITTER       | LUXEON V     | 700 mA        |
| LXHL-LRD5   | LAMBERTIAN   | STAR          | LUXEON V     | 700 mA        |

## Radiometric Power Characteristics at 350mA, Junction Temperature, $T_J = 25^\circ\text{C}$

| LUXEON     | CONFIGURATION | RADIATION PATTERN | MINIMUM RADIOMETRIC POWER (MW)<br>$\Phi_V^{[1,2]}$ | TYPICAL RADIOMETRIC POWER (MW)<br>$\Phi_V^{[2]}$ |
|------------|---------------|-------------------|----------------------------------------------------|--------------------------------------------------|
| LXHL-BRD I | EMITTER       | BATWING           | 115                                                | 140                                              |
| LXHL-MRD I | STAR          | BATWING           | 115                                                | 140                                              |

Notes (for both power tables):

1. Minimum radiometric power performance guaranteed within published operating conditions. Lumileds maintains a tolerance of  $\pm 10\%$  on power measurements.
2. Luxeon types with even higher radiometric power levels will become available in the future. Please consult your Lumileds Authorized Distributor or Lumileds sales representative for more information.

## Radiometric Power Characteristics at 700mA, Junction Temperature, $T_J = 25^\circ\text{C}$ , Continued

| LUXEON V  | CONFIGURATION | RADIATION PATTERN | MINIMUM RADIOMETRIC POWER (MW)<br>$\Phi_V^{[1,2]}$ | TYPICAL RADIOMETRIC POWER (MW)<br>$\Phi_V^{[2]}$ |
|-----------|---------------|-------------------|----------------------------------------------------|--------------------------------------------------|
| LXHL-PRD5 | EMITTER       | LAMBERTIAN        | 500                                                | 600                                              |
| LXHL-LRD5 | STAR          | LAMBERTIAN        | 500                                                | 600                                              |

## Optical Characteristics at 350 or 700mA, Junction Temperature, $T_J = 25^\circ\text{C}$

| PART NUMBER                | PEAK WAVELENGTH <sup>[3]</sup><br>$\lambda_P$ |      |      | SPECTRAL HALF-WIDTH <sup>[4]</sup><br>(NM)<br>$\Delta\lambda_{1/2}$ | TEMP COEFFICIENT OF DOMINANT WAVELENGTH<br>(NM/ $^\circ\text{C}$ )<br>$\Delta\lambda_D/\Delta T_J$ | TOTAL INCLUDED ANGLE <sup>[5]</sup><br>(DEGREES)<br>$\theta_{0.90V}$ | VIEWING ANGLE <sup>[6]</sup><br>(DEGREES)<br>$2\theta_{1/2}$ |
|----------------------------|-----------------------------------------------|------|------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------|
|                            | MIN.                                          | TYP. | MAX. |                                                                     |                                                                                                    |                                                                      |                                                              |
| LXHL-BRD I <sup>[11]</sup> | 450                                           | 460  | 470  | 20                                                                  | 0.04                                                                                               | 110                                                                  | 110                                                          |
| LXHL-MRD I <sup>[11]</sup> | 450                                           | 460  | 470  | 20                                                                  | 0.04                                                                                               | 110                                                                  | 110                                                          |
| LXHL-PRD5 <sup>[12]</sup>  | 450                                           | 460  | 470  | 20                                                                  | 0.04                                                                                               | 150                                                                  | 150                                                          |
| LXHL-LRD5 <sup>[12]</sup>  | 450                                           | 460  | 470  | 20                                                                  | 0.04                                                                                               | 150                                                                  | 150                                                          |

Notes:

1. Rated driver current of 350 mA for Luxeon Dental products.
2. Rated drive current of 700 mA for Luxeon V Dental products.
3. Lumileds maintains a tolerance of  $\pm 2\text{nm}$  for peak wavelength measurements.
4. Spectral width at  $\frac{1}{2}$  of the peak intensity.
5. Total angle at which 90% of total luminous flux is captured.
6.  $\theta_{1/2}$  is the off axis angle from lamp centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.
7. All products built with Indium Gallium Nitride (InGaN).
8. All power light sources represented here are IEC825 Class 2 for eye safety.

## Electrical Characteristics at 350 or 700mA, Junction Temperature, $T_J = 25^{\circ}\text{C}$

| PART NUMBER               | FORWARD VOLTAGE $V_F$ (V) <sup>[3]</sup> |      |      | DYNAMIC<br>RESISTANCE <sup>[4]</sup><br>( $\Omega$ ) $R_D$ | TEMPERATURE<br>COEFFICIENT OF<br>FORWARD VOLTAGE <sup>[5]</sup><br>(mV/ $^{\circ}\text{C}$ )<br>$\Delta V_F / \Delta T_J$ | THERMAL<br>RESISTANCE,<br>JUNCTION<br>TO SLUG OR<br>CASE <sup>[6]</sup><br>( $^{\circ}\text{C/W}$ ) $R_{\theta JC}$ |
|---------------------------|------------------------------------------|------|------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|                           | MIN.                                     | TYP. | MAX. |                                                            |                                                                                                                           |                                                                                                                     |
| LXHL-BRD I <sup>[1]</sup> | 2.79                                     | 3.42 | 3.99 | 1.0                                                        | -2.0                                                                                                                      | 15                                                                                                                  |
| LXHL-MRD I <sup>[1]</sup> | 2.79                                     | 3.42 | 3.99 | 1.0                                                        | -2.0                                                                                                                      | 17                                                                                                                  |
| LXHL-PRD5 <sup>[2]</sup>  | 5.43                                     | 6.84 | 7.83 | 1.0                                                        | -4.0                                                                                                                      | 8                                                                                                                   |
| LXHL-LRD5 <sup>[2]</sup>  | 5.43                                     | 6.84 | 7.83 | 1.0                                                        | -4.0                                                                                                                      | 11                                                                                                                  |

### Notes:

1. Rated drive current of 350 mA for Luxeon Dental products.
2. Rated drive current of 700 mA for Luxeon V Dental products.
3. Lumileds maintains a tolerance of  $\pm 0.06\text{V}$  on forward voltage measurements.
4. Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs. See Figures 3a and 3b.
5. Measured between  $25^{\circ}\text{C} \leq T_J \leq 110^{\circ}\text{C}$  at  $I_F = 350$  or  $700\text{mA}$ .
6. Thermal resistance junction to slug for emitter products, junction to board for star products.

## Absolute Maximum Ratings

| PARAMETER                                                           | LXHL-BRD I<br>LXHL-MRD I | LXHL-PRD5<br>LXHL-LRD5 |
|---------------------------------------------------------------------|--------------------------|------------------------|
| DC FORWARD CURRENT (mA) <sup>[1]</sup>                              | 350                      | 700                    |
| PEAK PULSED FORWARD CURRENT (mA)                                    | 500                      | 1000                   |
| AVERAGE FORWARD CURRENT (mA)                                        | 350                      | 700                    |
| REVERSE VOLTAGE (V) <sup>[2]</sup>                                  | > 5                      | > 5                    |
| LED JUNCTION TEMPERATURE ( $^{\circ}\text{C}$ )                     | 120                      | 135                    |
| EMITTER STORAGE TEMPERATURE ( $^{\circ}\text{C}$ )                  | -40 to +120              | -40 to +120            |
| EMITTER SOLDERING TEMPERATURE ( $^{\circ}\text{C}$ ) <sup>[3]</sup> | 260 FOR 5 SECONDS MAX    | 260 FOR 5 SECONDS MAX  |
| STAR ALUMINUM-CORE PCB TEMPERATURE ( $^{\circ}\text{C}$ )           | 100 <sup>[4]</sup>       | 70 <sup>[4]</sup>      |
| STAR STORAGE TEMPERATURE ( $^{\circ}\text{C}$ )                     | -40 to +105              | -40 to +105            |

### Notes:

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. Measured at  $I_F = 100\ \mu\text{A}$ . LEDs are not designed to be driven in reverse bias. All products are not sensitive to ESD damage ( $\pm 16,000$  Volts by HBM condition).
3. Measured at leads, during lead soldering and slug attach, body temperature must not exceed  $120^{\circ}\text{C}$ . 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 at rated DC forward current based on thermal resistance of Star assembly.

# Wavelength Characteristics, $T_J = 25^{\circ}\text{C}$

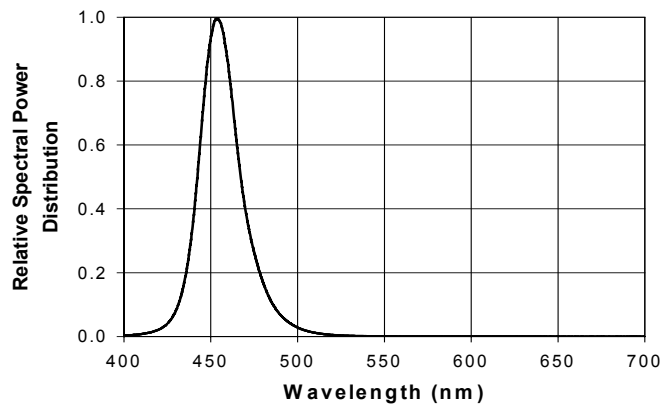


Figure 1.  
Relative Intensity vs. Wavelength.

# Light Output Characteristics

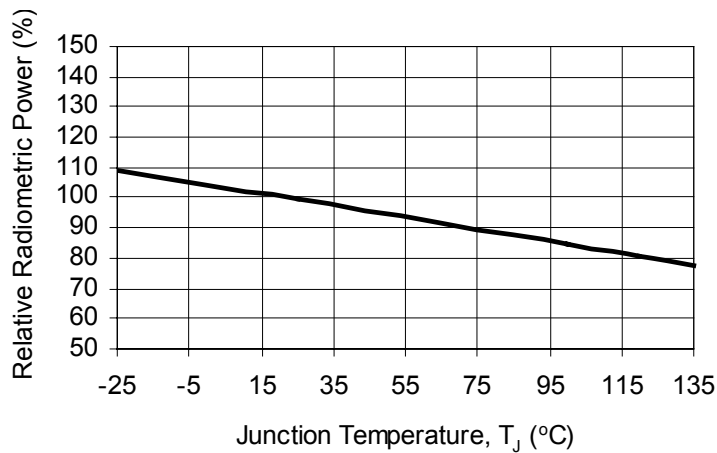


Figure 2.  
Relative Radiometric Power vs. Junction Temperature

## Forward Current Characteristics, $T_J = 25^\circ\text{C}$

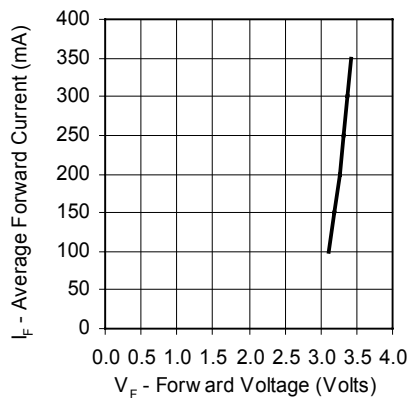


Figure 3a.  
Forward Current vs. Forward  
Voltage for LXHL-BRD1 and  
LXHL-MRD1

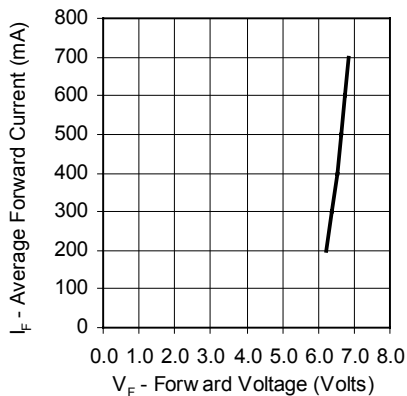


Figure 3b.  
Forward Current vs. Forward  
Voltage for LXHL-PRD5 and  
LXHL-LRD5

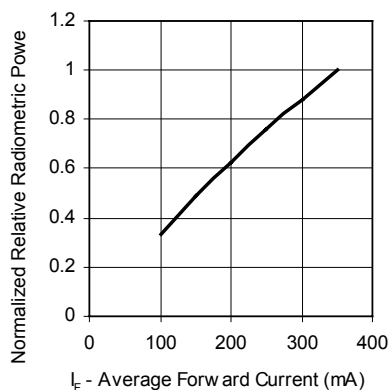


Figure 4a.  
Relative Luminous Flux vs.  
Forward Current for LXHL-BRD1  
and LXHL-MRD1 at  $T_J = 25^\circ\text{C}$   
maintained.

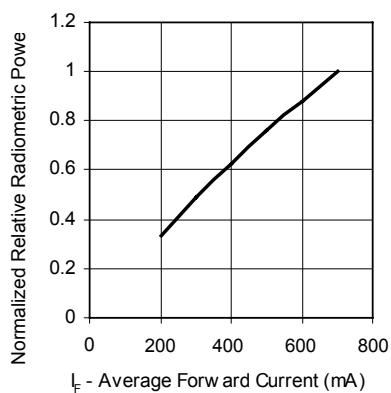


Figure 4b.  
Relative Luminous Flux vs.  
Forward Current for LXHL-PRD5  
and LXHL-LRD5 at  $T_J = 25^\circ\text{C}$   
maintained.

### 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.

# Current Derating Curves – Luxeon

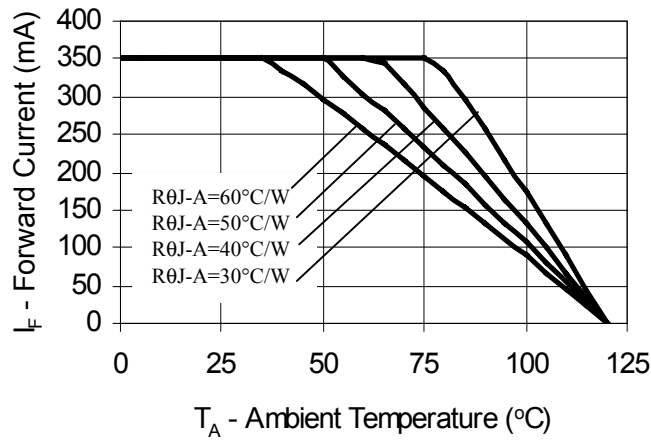


Figure 5.  
Maximum Forward Current vs. Ambient Temperature. Derating based on T<sub>JMAX</sub> = 120 °C for LXHL-BRD1 and LXHL-MRD1.

# Current Derating Curves – Luxeon V

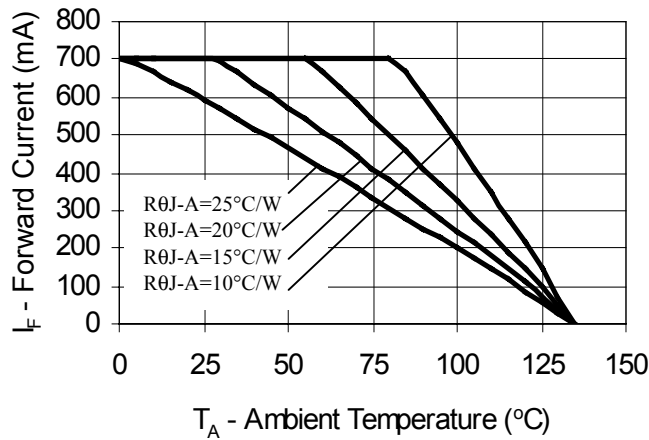


Figure 6.  
Maximum Forward Current vs. Ambient Temperature. Derating based on T<sub>JMAX</sub> = 135 °C for LXHL-PRD5 and LXHL-LRD5.

# Representative Spatial Radiation Pattern

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

## Batwing Radiation Pattern

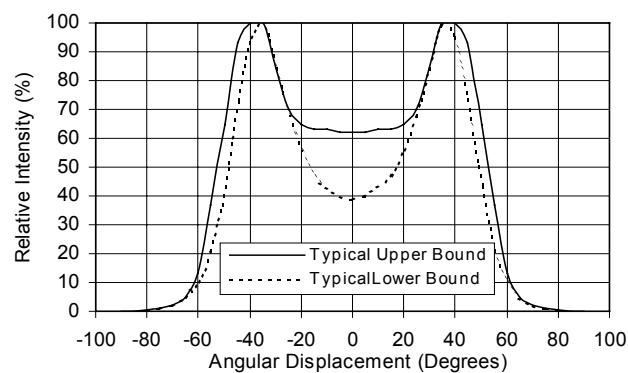


Figure 7.  
Representative Spatial Radiation Pattern  
for LXHL-BRD1 and LXHL-MRD1

## Lambertian Radiation Pattern

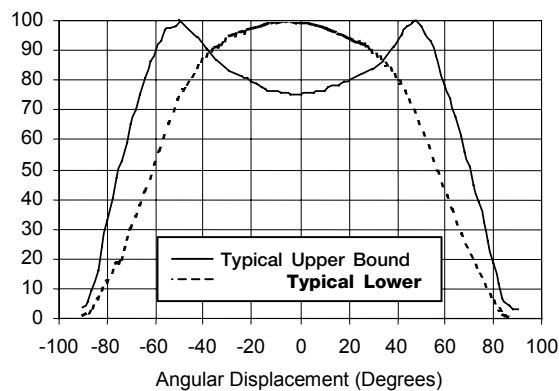


Figure 8.  
Representative Spatial Radiation Pattern  
for LXHL-PRD5 and LXHL-LRD5

## Emitter Reel Packaging

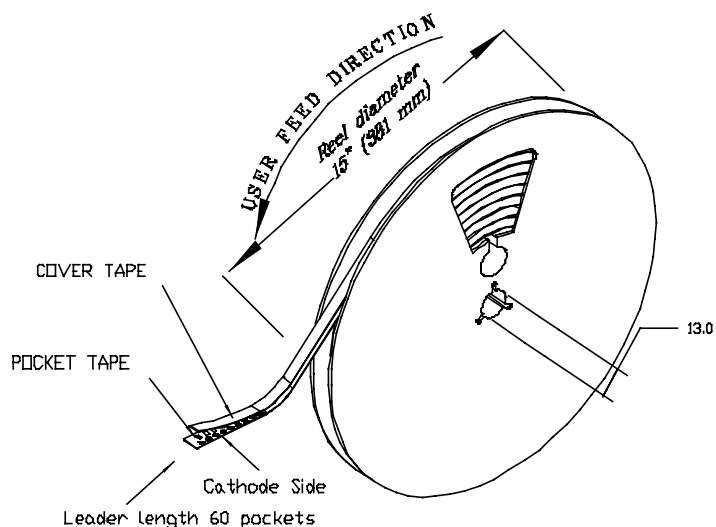


Figure 9.  
Reel dimensions and orientation.

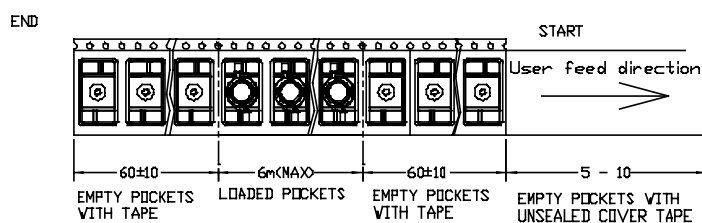
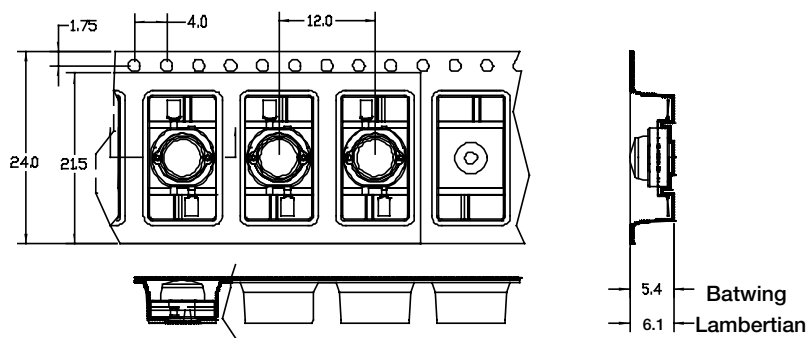


Figure 10.  
Tape dimensions.



### 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.

Buy it at:  
The LED Light Inc  
Carson City NV 89705  
Phone: 877-964-4215  
e-mail: [sales@TheLEDLight.com](mailto:sales@TheLEDLight.com)  
[www.TheLEDLight.com](http://www.TheLEDLight.com)