LUXEON™

Technical Data
Luxeon™ Star Power Light Source

Features

- Highest Flux per LED in the world
- Very long operating life (up to100k hours)
- Available in White, Green, Blue, Royal Blue, Cyan, Red, Red-Orange and Amber
- Lambertian or Batwing distribution pattern
- 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

Typical Applications

- Reading lights (car, bus, aircraft)
- Portable (flashlight, bike light)
- Orientation
- Mini accent
- Decorative
- Fiber Optic Alternative
- Appliance

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™ features one or more power light sources mounted onto an aluminum-core printed circuit board, allowing for ease of assembly, optimum cooling and accurate light center positioning.

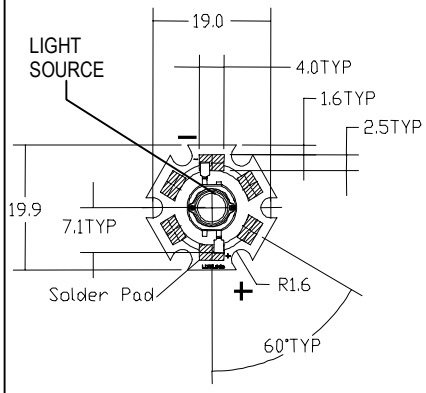
For tight beams, optional and highly efficient collimating optics are available.

For high volume applications, custom Luxeon™ power light source designs are available upon request, to meet your specific needs.

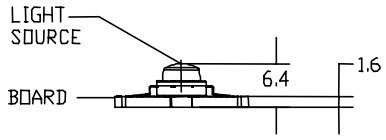
Luxeon™ Power Light Sources give you total design freedom and unmatched brightness, creating a new world of light.

Mechanical Dimensions

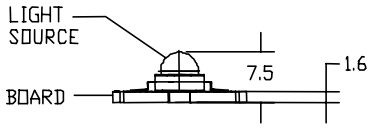
Luxeon™ Star[1]



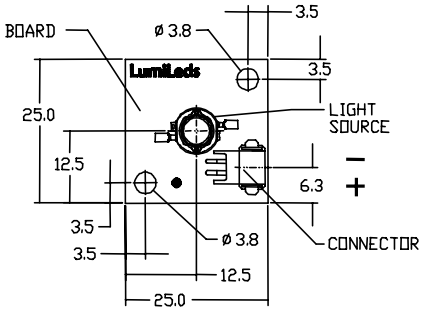
Batwing (low dome)



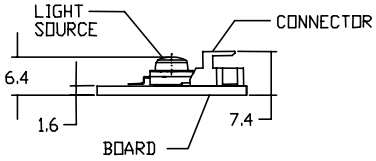
Lambertian (high dome)



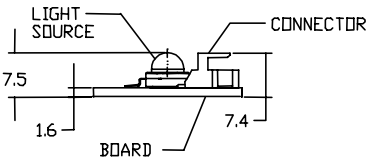
Luxeon™ Star /C [2]



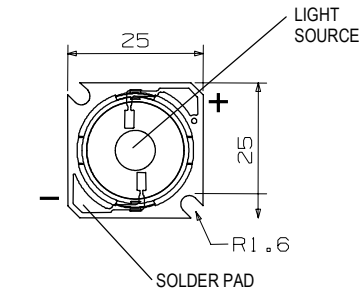
Batwing (low dome)

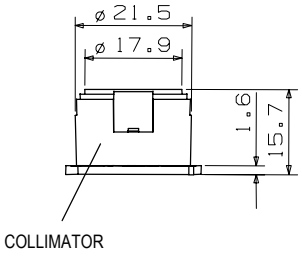


Lambertian (high dome)



Luxeon™ Star /O [3]





Notes:

1. For details on the interconnection of these devices, please consult the Luxeon™ OEM Guide, available upon request.
2. Connector on board AMP type, code 2-179123-2 ; Mating connector – AMP receptacle housing assembly, code 173977-2
3. Slots in aluminum-core PCB for M3 or #4 mounting screw.
4. Drawing not to scale.
5. All dimensions are in millimeters.

Flux Characteristics at 350mA, Junction Temperature, $T_J = 25^oC$

Color	Luxeon™ Star	Luxeon™ Star /C (with connector)	Luxeon™ Star /O (with optics)	Minimum Luminous Flux (lm) Φ_V [1,2]	Typical Luminous Flux (lm) Φ_V [2]	Radiation Pattern
WHITE	LXHL-MW1C	LXHL-MW1A	LXHL-NW98	13.9	18	Batwing (low dome)
GREEN	LXHL-MM1C	LXHL-MM1A	LXHL-NM98	13.9	25	
CYAN	LXHL-ME1C	LXHL-ME1A	LXHL-NE98	13.9	30	
BLUE[3]	LXHL-MB1C	LXHL-MB1A	LXHL-NB98	3.8	5	
ROYAL BLUE[4]	LXHL-MR1C	LXHL-MR1A	LXHL-NR98	1.7	4	
RED	LXHL-MD1C	LXHL-MD1A	LXHL-ND98	13.9	25	
AMBER	LXHL-ML1C	LXHL-ML1A	LXHL-NL98	10.7	20	
RED	LXHL-MD1D	LXHL-MD1B	LXHL-ND94	30.6	44	Lambertian (high dome)
RED-ORANGE	LXHL-MH1D	LXHL-MH1B	LXHL-NH94	39.8	55	
AMBER	LXHL-ML1D	LXHL-ML1B	LXHL-NL94	23.5	36	

Notes:
1. Minimum luminous flux performance guaranteed within published operating conditions.
2. Flux values for Luxeon™ Star without secondary optics. The efficiency of collimating optics is approximately 90%. 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.
3. Minimum flux value for 470 nm devices. Due to the CIE eye response curve in the short blue wavelength range, the minimum luminous flux will vary over the Lumileds' blue color range. Luminous flux will vary from a minimum of 2.9 lm at 460 nm to a typical of 8 lm at 480 nm due to this effect. Although the luminous power efficiency is lower in the short blue wavelength range, radiometric power efficiency increases as wavelength decreases. For more information, consult the Luxeon™ OEM Guide, available upon request.
4. The typical radiometric flux for Royal Blue Luxeon™ is 120 mW.

Optical Characteristics at 350mA, Junction Temperature, $T_J = 25^oC$

Radiation Pattern	Color	Typical Dominant Wavelength[1] λ_D or Color Temperature[2] CCT	Spectral Half-width[3] (nm) $\Delta\lambda_{1/2}$	Temperature Coefficient of Dominant Wavelength (nm/°C) $\Delta\lambda_D/\Delta T_J$	Luxeon™ Star		Luxeon™ Star /O (with optics)		
					Total Included Angle[4] (Degree) $\theta_{0.90V}$	Viewing Angle[5] (Degree) $2\theta_{½}$	Total Included Angle[4] (Degree) $\theta_{0.90V}$	Viewing Angle[5] (Degree) $2\theta_{½}$	Typical Candela on axis [9] (Cd)
Batwing (low dome)	White	5500 K	—	—	110	110	TBD	10	180
	Green	530 nm	35	0.04	110	110	TBD	10	500
	Cyan	505 nm	30	0.04	110	110	TBD	10	600
	Blue	470 nm	25	0.04	110	110	TBD	10	100[6]
	Royal Blue	455nm	20	0.04	110	110	TBD	10	80
	Red	625 nm	20	0.05	110	110	TBD	10	750
	Amber	590 nm	14	0.09	110	110	TBD	10	600
Lambertian (high dome)	Red	627 nm	20	0.05	160	140	TBD	10	660
	Red-Orange	617 nm	20	0.06	160	140	TBD	10	825
	Amber	590 nm	14	0.09	160	140	TBD	10	540

Notes:
1. Dominant wavelength is derived from the CIE 1931 Chromaticity diagram and represents the perceived color.
2. CRI (Color Rendering Index) for White product types is 70.
3. Spectral width at ½ of the peak intensity.
4. Total angle at which 90% of total luminous flux is captured.
5. θ½ is the off axis angle from lamp centerline where the luminous intensity is ½ of the peak value.
6. Typical candela on axis for 470 nm devices. Due to the CIE eye response curve in the short blue wavelength range, candela values will vary over the Lumileds' blue color range.
7. All red, red-orange and amber products built with Aluminum Indium Gallium Phosphide (AlInGaP).
8. All white, green, cyan and blue products built with Indium Gallium Nitride (InGaN).
9. All power light sources represented here are IEC825 Class 2 for eye safety.

Electrical Characteristics at Junction Temperature, T_J = 25°C

Radiation Pattern	Color	Minimum Forward Voltage V_F (V)	Typical Forward Voltage V_F (V)	Maximum Forward Voltage V_F (V)	Dynamic Resistance[1] (Ω) R_D	Temperature Coefficient of Forward Voltage[2] (mV/°C) $\Delta V_F/\Delta T_J$	Thermal Resistance, Junction to Board (°C/W) $R\theta_{J-B}$	Forward Test Current (mA) I_F
Batwing	White	2.79	3.42	3.99	1.0	-2.0	17	350
Batwing	Green	2.79	3.42	3.99	1.0	-2.0	17	350
Batwing	Cyan	2.79	3.42	3.99	1.0	-2.0	17	350
Batwing	Blue	2.79	3.42	3.99	1.0	-2.0	17	350
Batwing	Royal Blue	2.79	3.42	3.99	1.0	-2.0	17	350
Batwing	Red	2.31	2.85	3.27	2.4	-2.0	17	350
Batwing	Amber	2.31	2.85	3.27	2.4	-2.0	17	350
Lambertian	Red	2.31	2.95	3.51	2.4	-2.0	20	350
Lambertian	Red-Orange	2.31	2.95	3.51	2.4	-2.0	20	350
Lambertian	Amber	2.31	2.95	3.51	2.4	-2.0	20	350

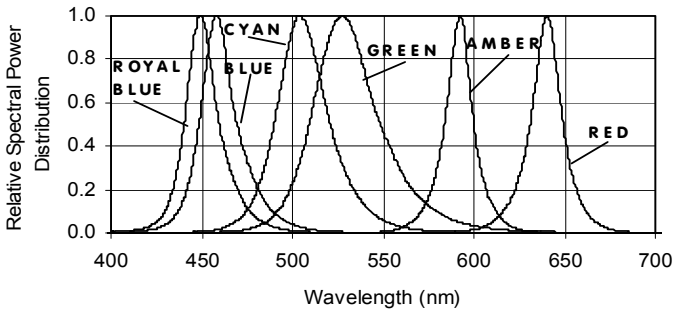
Notes:
1. Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs. See *Figures 2a and 2b*.
2. Measured between 25°C ≤ TJ ≤ 110°C at I_F = 350mA.

Absolute Maximum Ratings

Parameter		White/Green/Cyan/ Blue/Royal Blue	Red/Amber Red-Orange
DC Forward Current (mA) [1]		350	385
Peak Pulsed Forward Current (mA)		500	550
Average Forward Current (mA)		350	350
Reverse Voltage (V)[2]		> 5	> 5
LED Junction Temperature (°C)		120	120
Aluminum-Core PCB Temperature (°C)		105	105
Storage & Operating Temperature (°C)	Luxeon™ Star	-40 to +105	-40 to +105
	Luxeon™ Star /O	-40 to +75	-40 to +75

Notes:
1. Proper current derating must be observed to maintain junction temperature below the maximum. For more information, consult Luxeon™ OEM Guide, available upon request.
2. Measured at I_F = 100 μ A. LEDs are not designed to be driven in reverse bias. All products are not sensitive to ESD damage (+/-16,000 Volts by HBM condition).

Wavelength Characteristics



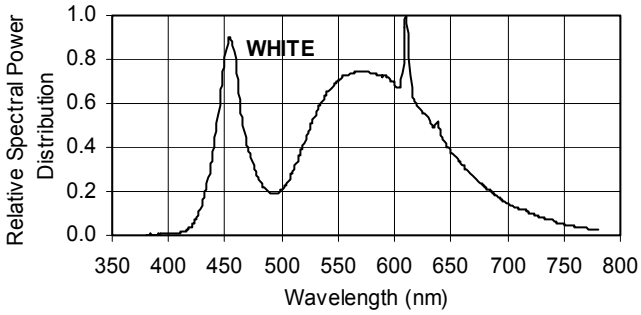


Figure 1. Relative Intensity vs. Wavelength

Forward Current Characteristics, T_J = 25°C

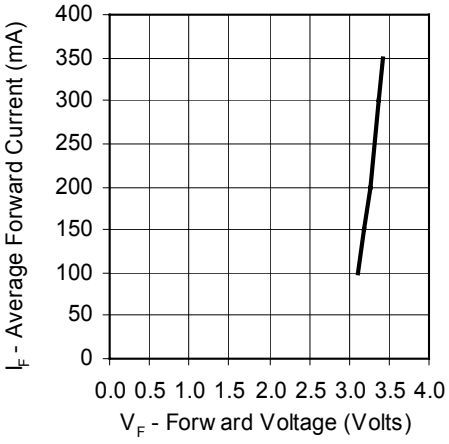


Figure 2a. Forward Current vs. Forward Voltage For White, Green, Cyan, Blue, Royal Blue.

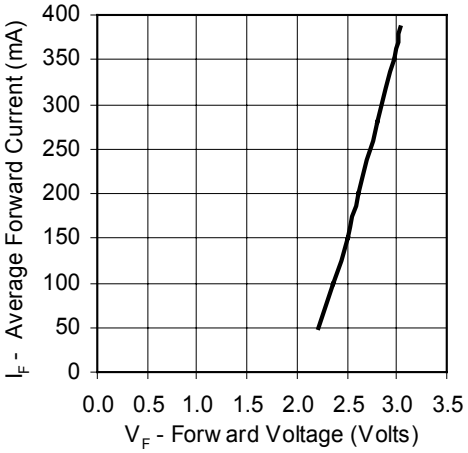


Figure 2b. Forward Current vs. Forward Voltage for Red, Red-Orange and Amber.

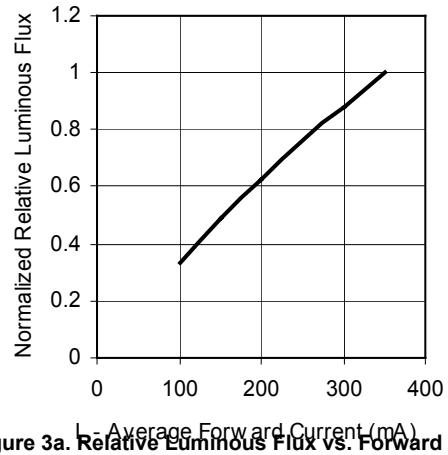


Figure 3a. Relative Luminous Flux vs. Forward Current for White, Green, Cyan, Blue, and Royal Blue at T_J=25°C maintained.

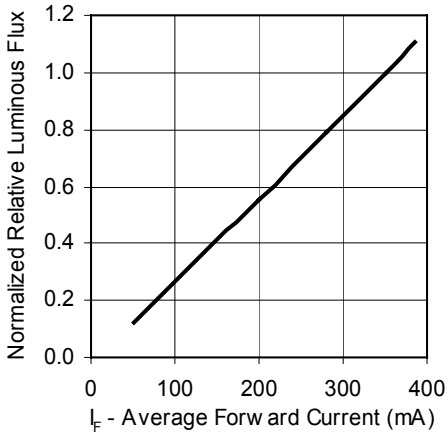


Figure 3b. Relative Luminous Flux vs. Forward Current for Red, Red-Orange and Amber at T_J=25°C maintained.

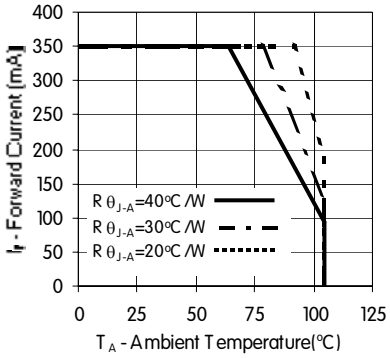


Figure 4a. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 120°C for White, Green, Cyan, Blue and Royal Blue.

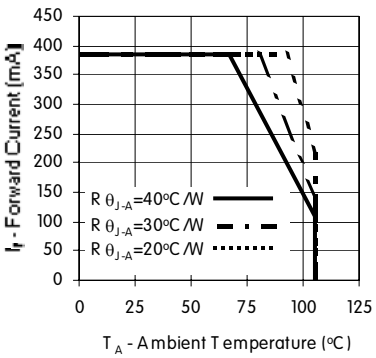


Figure 4b. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 120°C for Red, Red-Orange and Amber.

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 is recommended for dimming effects.

Light Output Characteristics

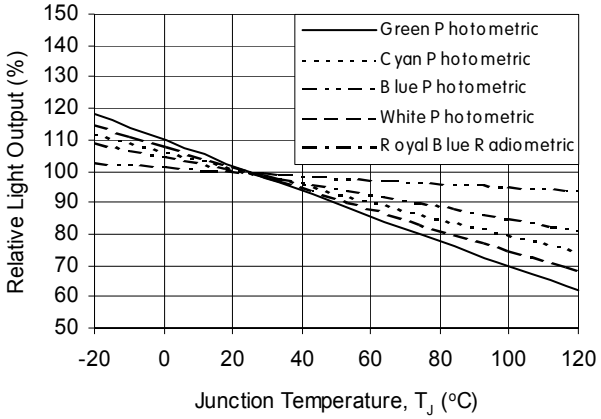


Figure 5a. Relative Light Output vs. Junction Temperature for White, Green, Cyan, Blue, and Royal Blue.

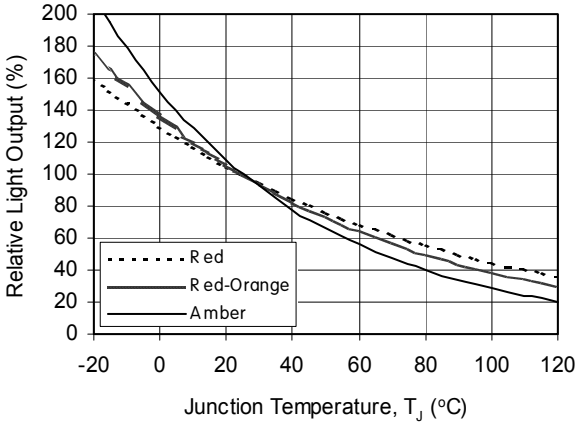


Figure 5b. Relative Light Output vs. Junction Temperature for Red, Red-Orange and Amber.

Representative Spatial Radiation Pattern

Batwing Radiation Pattern (without optics)

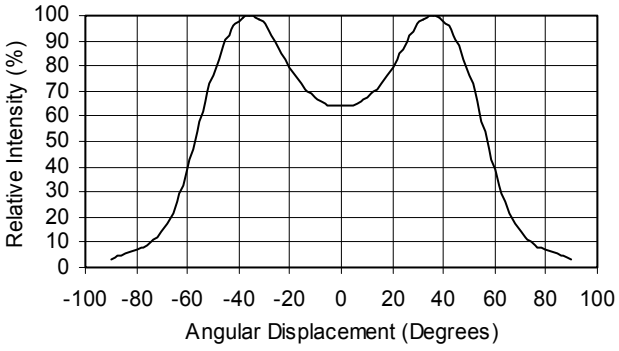


Figure 6a. Representative Spatial Radiation Pattern for Luxeon™ Star White.

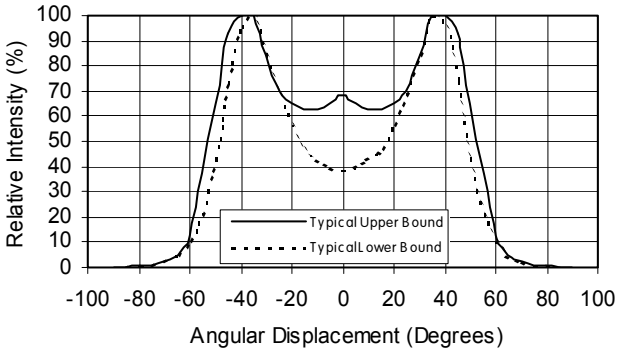


Figure 6b. Representative Spatial Radiation Pattern for Luxeon™ Star Red, Amber, Green, Cyan, Blue, and Royal Blue.

Lambertian Radiation Pattern (without optics)

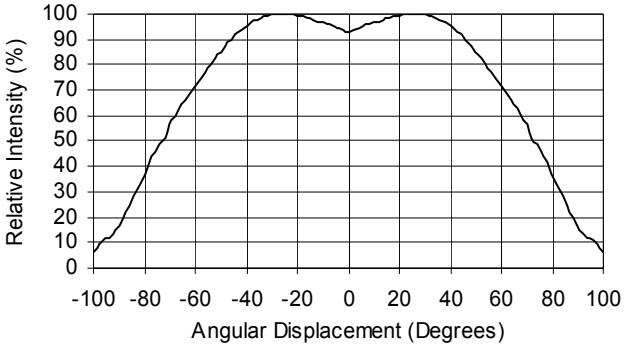


Figure 7. Representative Spatial Radiation Pattern for Luxeon™ Star Red, Red-Orange, and Amber.

Radiation Pattern (with optics)

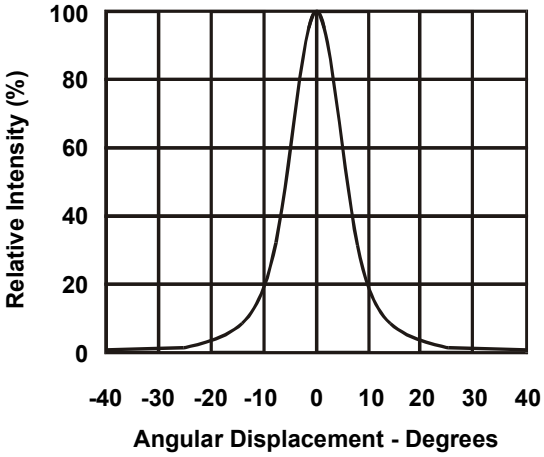


Figure 8. Representative Spatial Radiation Pattern for Luxeon™ Star /O (with optics) for all colors.

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

Average Lumen Maintenance Characteristics

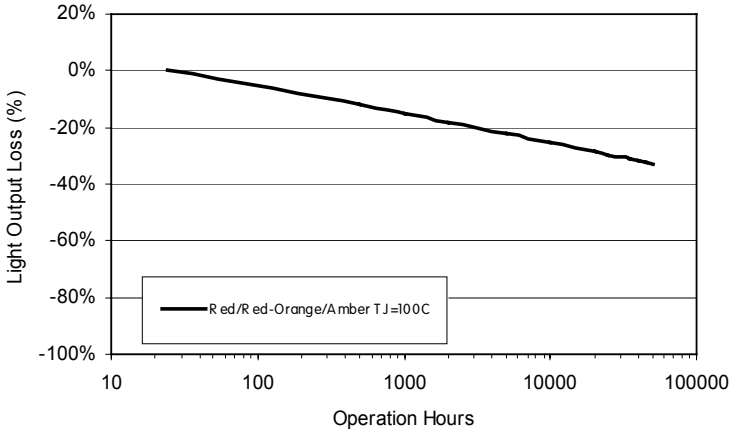


Figure 9. Light Output vs. Time for Amber, Red-Orange and Red at I_F 385mA.

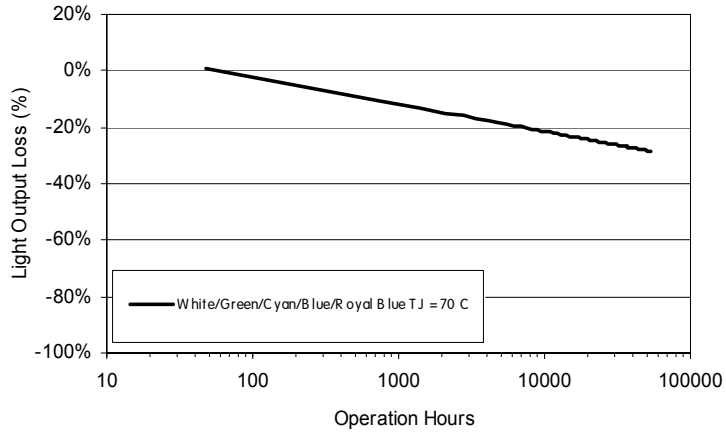


Figure 10. Light Output vs. Time for White, Green, Cyan, Blue, and Royal Blue at I_F 350mA, Relative Humidity less than 20%.

Luxeon™
A New World of Light

Lumileds may make process or materials changes affecting the performance or other characteristics of Luxeon™. These products supplied after such change will continue to meet published specifications, but may not be identical to products supplied as samples or under prior orders.

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!

LUMILEDS
LIGHT FROM SILICON VALLEY

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.

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