UPBLED470L

LOW VOLTAGE BLUE LED

PRODUCT PREVIEW

Microsemi's high brightness UPBLED470L product is a new LED which features a low forward voltage for low power consumption. This offers impressive brightness with industry leading thermal resisitivity. These products deliver superior thermals that keep junction temperatures low with a remarkable package thermal resisitivity of 110 degrees C/Watt. The blue packages also deliver a very wide viewing angle able to easily integrate into optical lenses. The Optomite package performs extremely well under extreme temperature conditions with less wavelength shift and intensity degradation seen by many competitors.

IMPORTANT: For the most current data, consult *MICROSEMI*'s website: **http://www.microsemi.com**

KEY FEATURES

- Low Thermal Resistance
- Rugged Optomite 0603 package
- Low forward voltage
- High Brightness
- Broad angular Emission

APPLICATIONS/BENEFITS

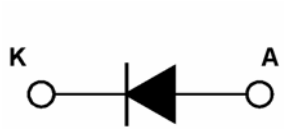
- Mobil Phone Keypad
- Panel, button, switch indicators.
- Backlighting
- Signage
- Signals and Marker Lights

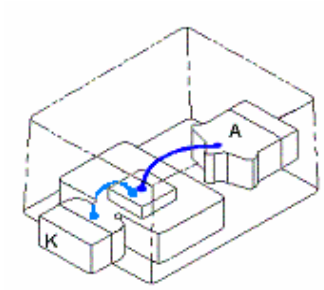
ABSOLUTE MAXIMUM RATINGS AT 25° C (UNLESS OTHERWISE SPECIFIED)

Parameters	Symbol	Value	Unit DC
Forward Drive Current	I_F	30	mA
Peak Forward Current	I_{FP}	100	mA
LED Operating Junction Temperature	Tj	-40 to +150	°C
Reverse Voltage	V_R	8	V
Power Dissipation	P_D	125	mW
Operating Temperature	T_{OPR}	-40 to +125	°C
Storage Temperature	T_S	-45 to +150	°C
Electrostatic Discharge	ESD	1000	V
ESD classification		Class 2	

THERMAL CHARACTERISTICS (UNLESS OTHERWISE SPECIFIED)

Thermal Resistance	Symbol	Value	Units
Junction-to Soldering Point	$R_{\theta JS}$	110	°C/W





For operation of these LEDs in pulse mode applications, devices may be used in conjunction with the Microsemi LX1992LED Drivers

Rev. 0.02, 2003-01-15

Microsemi
580 Pleasant Street, Watertown, MA. 02472-2408, 617-926-0404, Fax: 617-924-1235

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ELECTRICAL PARAMETERS @ 25°C & ID=20 mA (unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ.	Max	Units
Radiant Intensity	I_E	DC Drive Current = 5mA		180		µW/sr
		DC Drive Current = 10mA		350		
		DC Drive Current = 20mA		645		
		DC Drive Current = 30mA		900		
Luminous Intensity	I_V	DC Drive Current = 5mA		15		mcd
		DC Drive Current = 10mA		26		
		DC Drive Current = 20mA	35	45		
		DC Drive Current = 30mA		60		
Dominant Wavelength	λ_{DOM}	DC Drive Current = 20mA		469		nm
Chrom x Chrom y		DC Drive Current = 20mA		.137 .066		
Angle Coverage to 50% points	$\alpha 1/2$	DC Drive Current = 5mA to 50mA	140			deg.
Radiant Flux	Φ_E	DC Drive Current = 5mA		0.5		mW
		DC Drive Current = 10mA		0.92		
		DC Drive Current = 20mA		1.7		
		DC Drive Current = 30 mA		2.4		
Luminous Flux	Φ_V	DC Drive Current = 5mA		45		mlm
		DC Drive Current = 10mA		75		
		DC Drive Current = 20mA		125		
		DC Drive Current = 30mA		170		
Full Width Half Max	FWHM	DC Drive Current = 20mA		33		nm
Forward Voltage	V_F	DC Drive Current = 5mA		2.88		V
		DC Drive Current = 10mA		2.97	3.1	
		DC Drive Current = 15mA		3.05		
		DC Drive Current = 20mA		3.11		
		DC Drive Current = 30mA		3.22		
Reverse Leakage Current	I_R	Reverse Voltage = 5 V			10	µA

- Change in Radiant Intensity with temperature –1.2µW/sr/°C (25°C < temp< 85°C)
- Change in Radiant Intensity with temperature 0.6µW/sr/°C (25°C < temp< -40°C)

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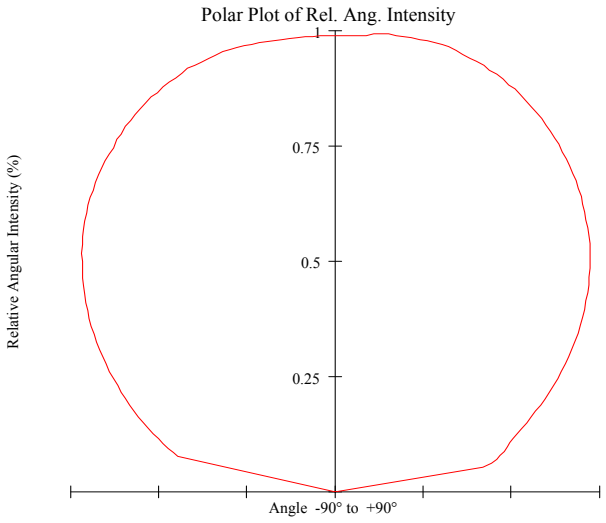
DIRECTIVITY

Polar plot of angular Intensity %

TYPICAL ANGULAR DISTRIBUTION OF RADIANT AND LUMINOUS INTENSITY



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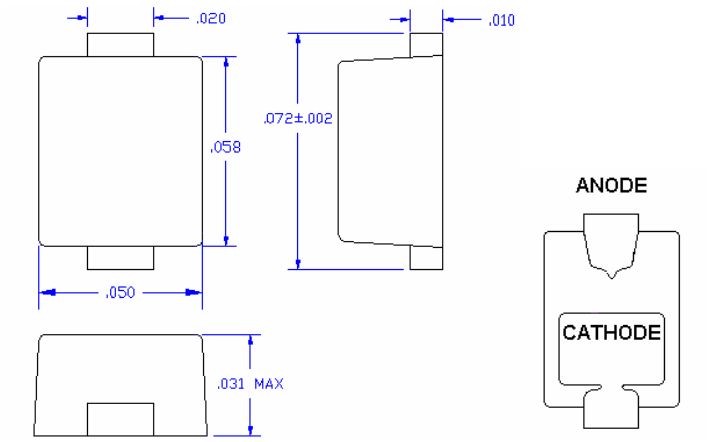
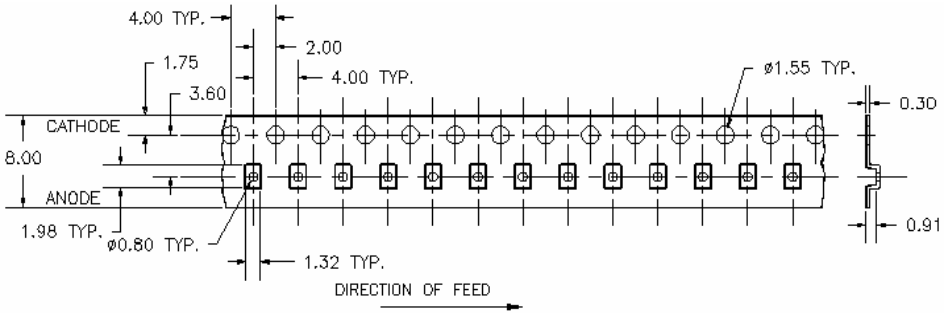


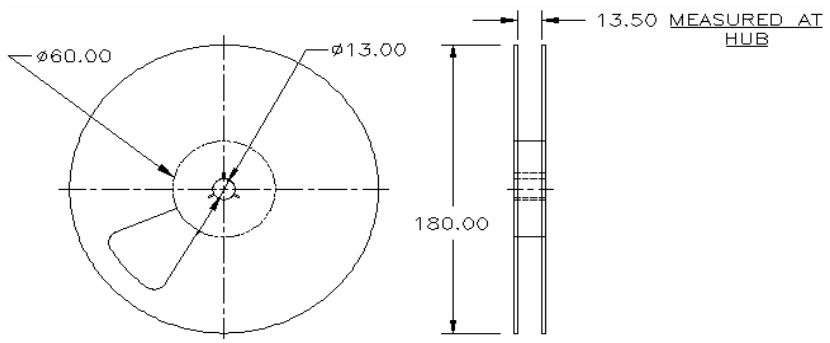
BOTTOM VIEW

Notes: Anode is identified by observing the underside of the LED.
(Anode is the smaller of the two base pads)
Mount to circuit board using 60/40 Pb/Sn or equivalent.
Maximum solder melt exposure temperature is 260°C for 10 seconds.

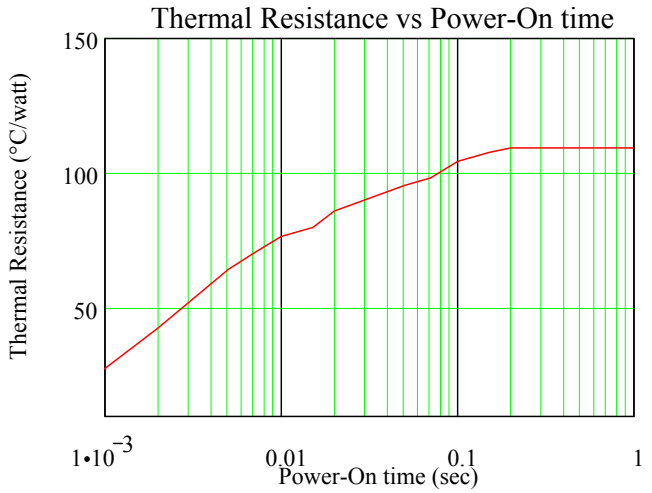
TAPE AND REEL
3,000 units/reel

Notes: Dimensions is shown in metric.

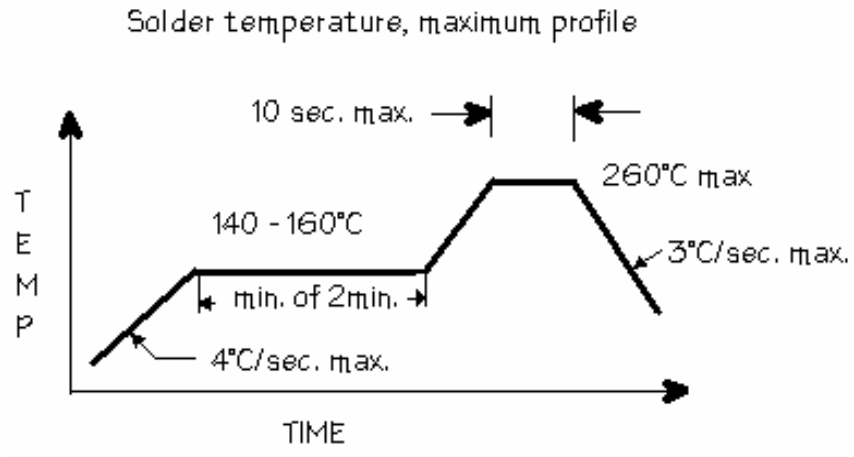




MECHANICAL



Steady State Thermal Resistance Junction-to-Optomite base metal ~ 110°C
Thermal time constant ~20 mS (@ 0.632 x $R_{\theta max}$).
Steady state temperature at ~ 500 mS.



60%pb - 40% sn liquidus = 238°C, solidus = 183°C
50%pb - 50% sn, liquidus = 216°C, solidus = 183°C

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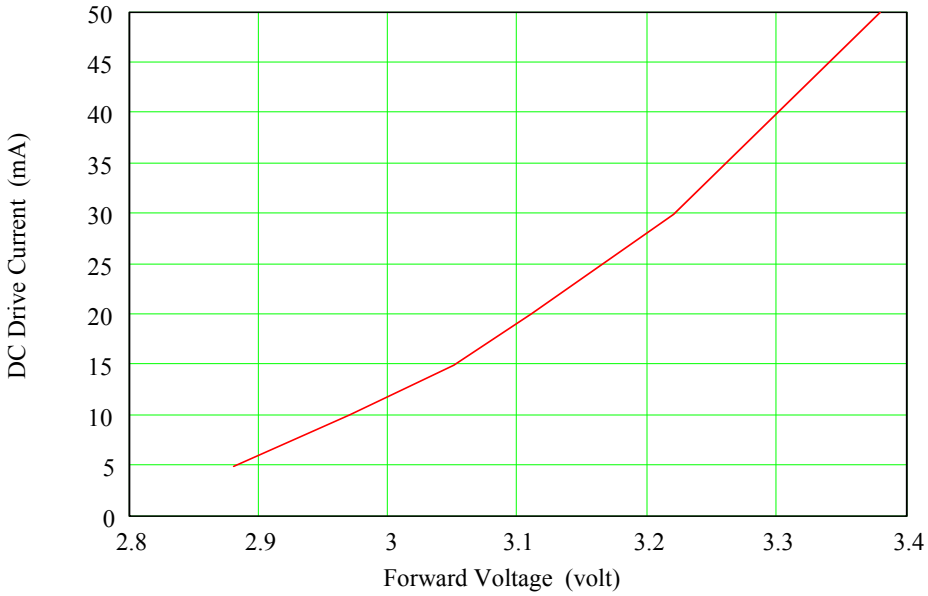

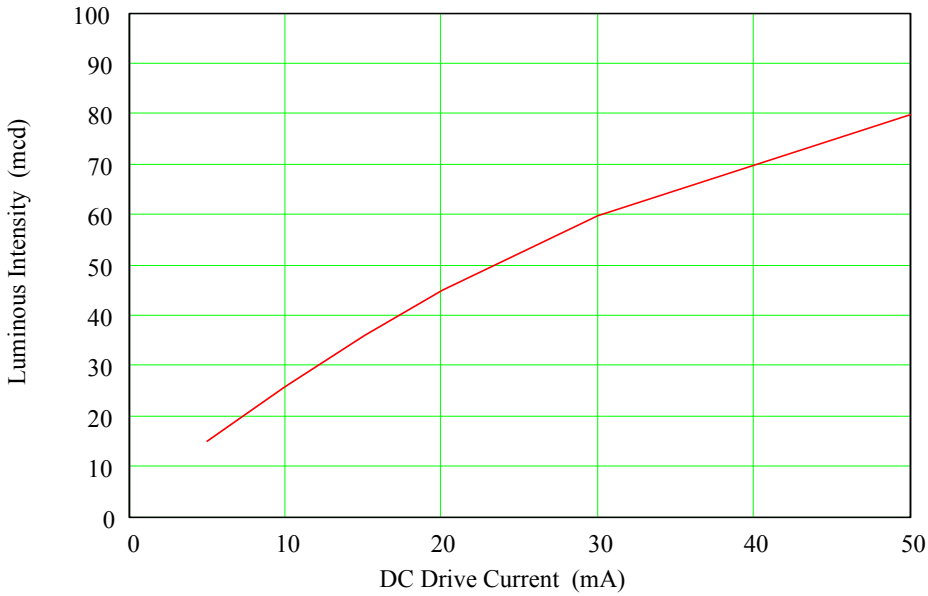

***CALCULATION FOR SAFE OPERATION ABOVE 20 ma dc*:**

The power dissipation must be held at a level to maintain the junction below the maximum specified operating temperature.

Duty cycle control may be used to establish the safe operating condition using a train of pulses.

LED Junction temperature may be calculated by use of the following:

$$T_J := T_{Case} + V_F \cdot I_{Dpk} \cdot \left[\frac{t_p \cdot R\theta_{JS}}{\tau} + \left(1 - \frac{t_p}{\tau}\right) \cdot Z\theta_{\tau + t_p} - Z\theta_{\tau} + Z\theta_{tp} \right]$$

$\mathbf{T_{Case}}$ is at a specified temperature. $\mathbf{V_F}$ and $\mathbf{I_{Dpk}}$ values are read off graph of forward voltage vs drive current. $\mathbf{t_p}$ and $\boldsymbol{\tau}$ are set by the on-time and pulse period of the drive circuit. Thermal Impedances ($\mathbf{Z_\theta}$) and Thermal resistance ($\mathbf{R_\theta}$) values are read from Thermal Impedance graph.

Conversion of 1931 x y coordinates to 1960 *u v* coordinates:

$u = 4x/(-2x + 12y + 3)$, $v = 6y/(-2x + 12y +3)$

Conversion of 1960 *u v* coordinates to 1931 *x y* coordinates:

$x = 3u/(2u - 8v +4)$, $y = 2v/(2u -8v +4)$.

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