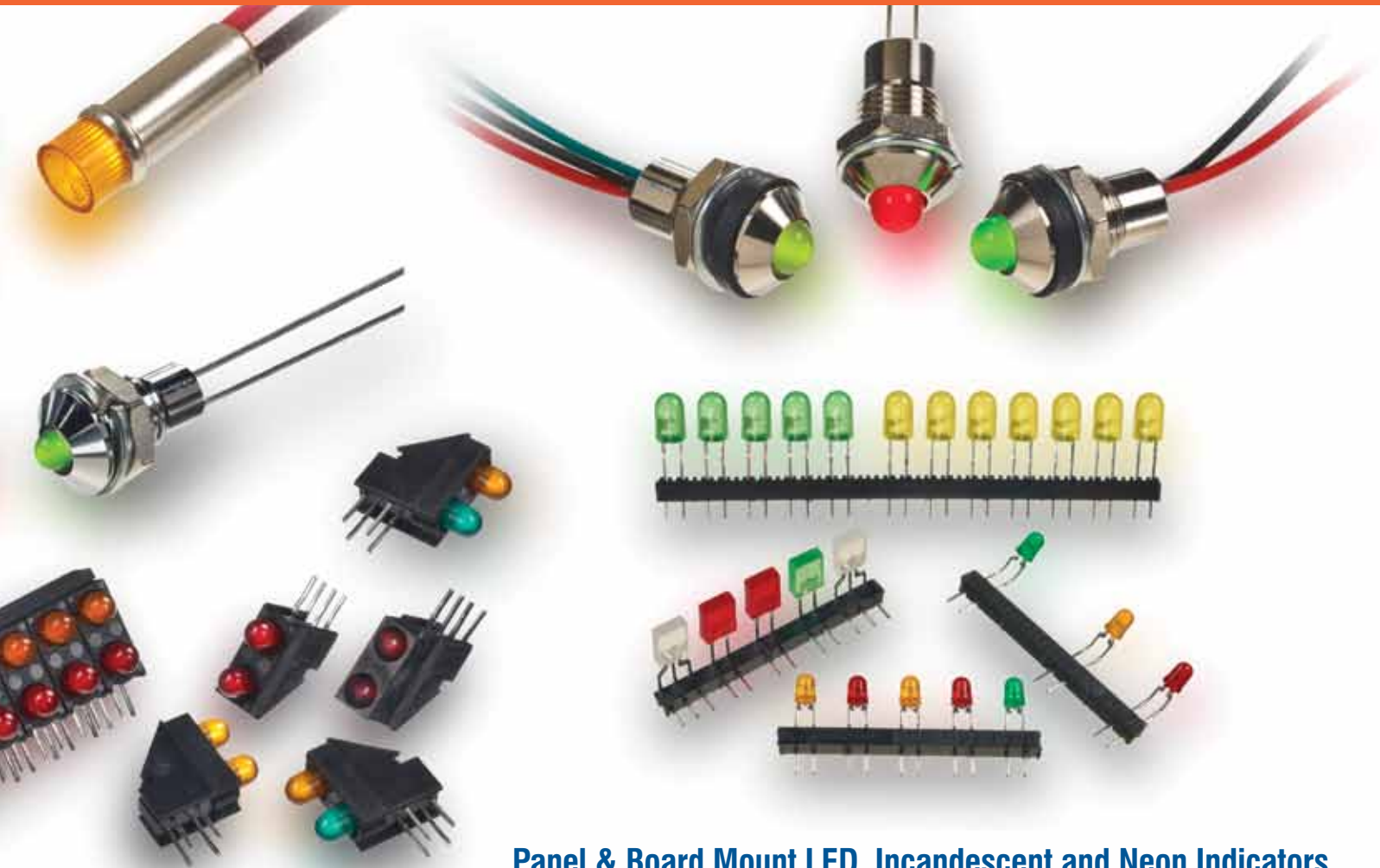




WILBRECHT LEDCO, INC.

A Microprecision Company



Panel & Board Mount LED, Incandescent and Neon Indicators

Dear Customer,

For over 50 years Wilbrecht Ledco, Inc., a subsidiary of Microprecision Electronics, has provided OEM customers with customized precision electromechanical components manufactured in the United States for demanding medical, aerospace and telecommunications applications.

Wilbrecht Ledco is known in the industry for its innovative multiple LED bar mount design, which allows the assembly of virtually any combination of colors and LED types. This flexibility is also represented in Ledco's front and rear panel mount indicator lights, which can be supplied with custom defined lead lengths, colors and connectors.

Today Wilbrecht Ledco manufactures LED indicator lights, board mount LED assemblies as well as ultra-low TCR metal foil resistors in its Huron, South Dakota factory. This is a QPL and NASA qualified production site.

Sales offices for all Wilbrecht Ledco products as well as the complete switch range of Microprecision Electronics are located in St. Paul, Minnesota.

For more information, please contact one of our locations or visit our websites.

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Special Features

- Sealed against moisture and dust – watertight gasket option and IP66 sealing available
- Optional internal resistor for 5V-60VDC – resistor on lead for 3 leaded bicolor LED
- Custom assemblies for 5V-60VAC and 120VAC
- Mil Spec MIL-W22759/33 wire and connector options

Specifications

- Mounting hole: .230" $\pm$.002" (5.84 $\pm$ 0.05 mm)
- Termination: 24 AWG UL1061 6.0" (152.4mm) red (anode) and black (cathode) leads stripped to .250" (6.35 mm) standard or LED pins
- Housing: Nickel-plated brass or black anodized brass housing
- Maximum panel thickness: .130" (3.30mm) standard, .070" (1.78mm) with gasket
- Mounting torque: 20 +/- 2 in-lb (2.26 +/- 0.23N-mm)

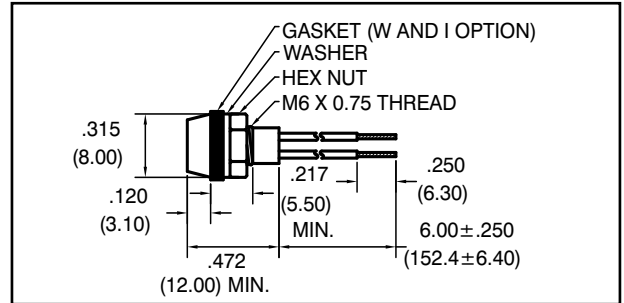
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
8708	Red	40.0	20	2.0	20	35°	635
8709	Green	40.0	20	2.2	20	35°	568
8710	Yellow	30.0	20	2.1	20	35°	585
LOW CURRENT (Use-0001 for resistor code)							
8702	Red	6.0	2	1.8	2	40°	635
8703	Green	8.0	2	1.8	2	40°	568
8704	Yellow	4.0	2	1.9	2	40°	585
BICOLOR (2 leaded)							
8700	Red	30.0	20	2.0	20	45°	635
	Green	30.0	20	2.2	20		568
8701	Yellow	15.0	20	2.1	20	45°	585
	Green	30.0	20	2.2	20		568
BICOLOR (3 leaded-common cathode)							
3804	Red	44.0	20	2.0	20	60°	627
	Green	34.0	20	2.2	20		565
3803	Yellow	17.0	20	2.1	20	60°	590
	Green	34.0	20	2.2	20		565
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
8713	Red	198.0	22	5.0	22	60°	660
ULTRA BRIGHT - DAYLIGHT READABLE							
2702	Red	299.0	20	1.85	20	60°	660
2700	Green	199.0	20	2.1	20	60°	574
2701	Yellow	219.0	20	2.0	20	60°	590
SUPER BLUE							
8711	Blue	2300.0	20	3.5	20	25°	470
WHITE							
8712	White	250.0	20	3.6	20	30°	N/A



3mm Panel Mount LED Assemblies

Package Dimensions



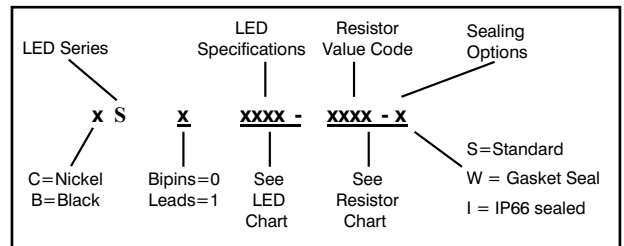
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10		
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4350
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color and Tri-Color not available in AC voltages

How To Order



Special Features

- Sealed against moisture and dust – watertight gasket option and IP66 sealing available
- Optional internal resistor for 5V-60VDC – resistor on lead for 3 leaded bicolor LED
- Custom assemblies for 5V-60VAC and 120VAC
- Mil Spec MIL-W22759/33 wire and connector options

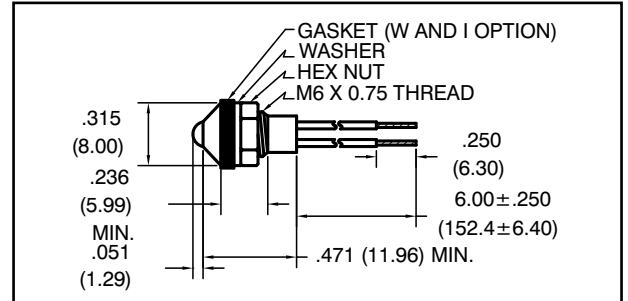
Specifications

- Mounting hole: .230" $\pm$.002" (5.84 $\pm$ 0.05 mm)
- Termination: 24 AWG UL1061 6.0" (152.4mm) red (anode) and black (cathode) leads stripped to .250" (6.35 mm) standard or LED pins
- Housing: Nickel plated brass housing
- Maximum panel thickness: .150" (3.81 mm) standard, .090" (2.29 mm) watertight
- Mounting torque: 20 $\pm$ 2 in-lb (2.26 $\pm$ 0.23 N-mm)



3mm Panel Mount LED Assemblies

Package Dimensions



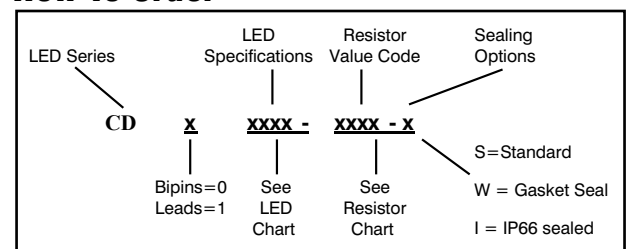
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	34.0 Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color and Tri-Color not available in AC Voltages

How To Order



Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
8708	Red	40.0	20	2.0	20	35°	635
8709	Green	40.0	20	2.2	20	35°	568
8710	Yellow	30.0	20	2.1	20	35°	585
LOW CURRENT (Use-0001 for resistor code)							
8702	Red	6.0	2	1.8	2	40°	635
8703	Green	8.0	2	1.8	2	40°	568
8704	Yellow	4.0	2	1.9	2	40°	585
BICOLOR (2 leaded)							
8700	Red	30.0	20	2.0	20	45°	635
	Green	30.0	20	2.2	20		568
8701	Yellow	15.0	20	2.1	20	45°	585
	Green	30.0	20	2.2	20		568
BICOLOR (3 leaded-common cathode)							
3804	Red	44.0	20	2.0	20	60°	627
	Green	34.0	20	2.2	20		565
3803	Yellow	17.0	20	2.1	20	60°	590
	Green	34.0	20	2.2	20		565
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
8713	Red	198.0	22	5.0	22	60°	660
ULTRA BRIGHT - DAYLIGHT READABLE							
2702	Red	299.0	20	1.85	20	60°	660
2700	Green	199.0	20	2.1	20	60°	574
2701	Yellow	219.0	20	2.0	20	60°	590
SUPER BLUE							
8711	Blue	2300.0	20	3.5	20	25°	470
WHITE							
8712	White	250.0	20	3.6	20	30°	N/A

Special Features

- Sealed against moisture and dust – gasket option and IP66 sealing available
- Optional internal resistor for 5V-60VDC, 5V-60VAC and 120VAC option
- Mil Spec MIL-W22759/33 wire and connector options

Specifications

- Mounting hole: .312" ± .002" (7.93 ± 0.05 mm)
- Termination: 24 AWG UL1061 6.0" (152.4 mm) red (anode) and black (cathode) leads stripped .250" (6.35 mm) standard or LED pins
- Housing: Nickel plated brass or black anodized brass housing
- Maximum panel thickness: .160" (4.06 mm) standard, .100" (2.54 mm) gasket seal
- Mounting torque: 20 ± 2 in-lb (2.26 ± 0.23 N-m)

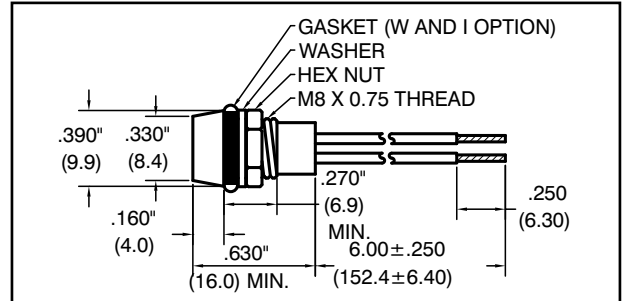
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT – DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	300.0	20	3.2	20	30°	520
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BICOLOR (3 leaded – common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
TRICOLOR (4 leaded – common cathode)							
3900	Red	547.0	20	1.9	20	60°	640
	Yellow	397.0	20	2.0	20	60°	590
	Green	497.0	20	3.2	20	60°	520
FULL COLOR R/G/B (4 leaded – common anode)							
2400	Red	2490.0	20	2.2	20	60°	640
	Green	377.0	20	3.2	20	60°	520
	Blue	1095.0	20	3.3	20	60°	461
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A



5mm Panel Mount LED Assemblies

Package Dimensions



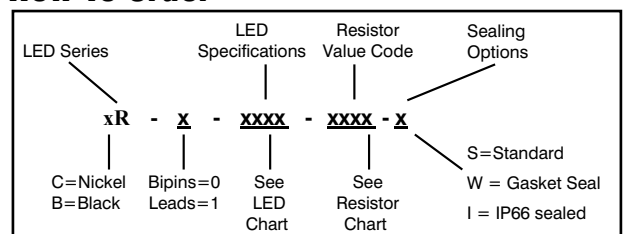
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	3.5	34000	Contact WLI

Note: Bi-Color and Tri-Color not available in AC voltages

How To Order



Special Features

- Sealed against moisture and dust – gasket option and IP66 sealing available
- Optional internal resistor for 5V-60VDC, 5V-60VAC and 120VAC option available
- Mil Spec MIL-W22759/33 wire and connector options

Specifications

- Mounting hole: .312" $\pm$.002" (7.93 $\pm$ 0.05 mm)
- Termination: 24 AWG UL1061 6.0" (152.4 mm) red (anode) and black (cathode) leads stripped .250" (6.35 mm) standard or LED pins
- Housing: Nickel-plated brass
- Maximum panel thickness: .200" (5.08 mm) standard, .140" (3.56 mm) with gasket
- Mounting torque: 20 $\pm$ 2 in-lb (2.26 $\pm$ 0.23 N-m)

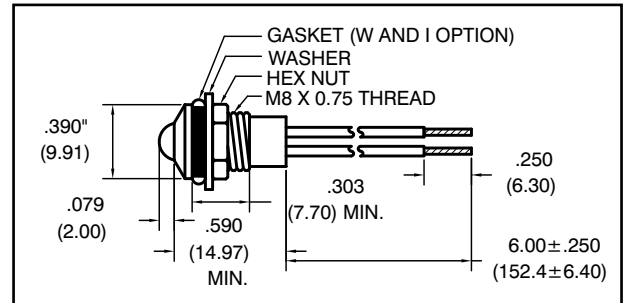
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT – DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	300.0	20	3.2	20	30°	520
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BICOLOR (3 leaded – common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
TRICOLOR (4 leaded – common cathode)							
3900	Red	547.0	20	1.9	20	60°	640
	Yellow	397.0	20	2.0	20	60°	590
	Green	497.0	20	3.2	20	60°	520
FULL COLOR R/G/B (4 leaded – common anode)							
2400	Red	2490.0	20	2.2	20	60°	640
	Green	377.0	20	3.2	20	60°	520
	Blue	1095.0	20	3.3	20	60°	461
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A



5mm Panel Mount LED Assemblies

Package Dimensions



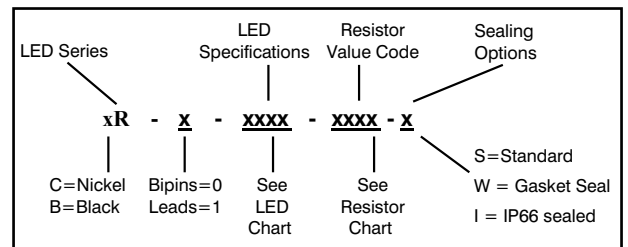
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	3.5	34000	Contact WLI

Note: Bi-Color and Tri-Color not available in AC voltages

How To Order



Special Features

- Rugged watertight construction – sealed to IP66
- Rear mounts in .315" (8.00 mm) D-shaped hole
- Optional internal resistor for for 5V-60VDC, 5V-60VAC and 120VAC option
- Mil Spec MIL-W22759/33 wire and connector options
- Internally potted-suitable for high vibration applications

Specifications

- Mounting hole: .315" $\pm$.002" (8.00 $\pm$ 0.05 mm) D-shaped hole
- Termination: 24AWG UL1061 6.0" (152.4mm) red(anode) and black (cathode) leads stripped .250" (6.35 mm) standard or LED pins
- Housing: Nickel-plated brass housing
- Panel thickness: .118" $\pm$.006" (3.00 $\pm$ 0.15mm) Spacer available for .060" (1.52 mm) thick panel
- Mounting torque: 20 $\pm$ 2 in-lb (2.26 $\pm$ 0.23 N-mm)

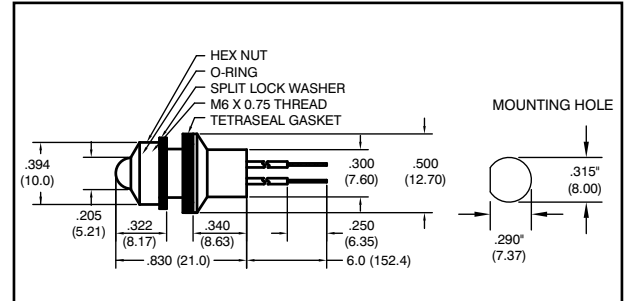
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT – DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	300.0	20	3.2	20	30°	520
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BICOLOR (3 leaded – common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
TRICOLOR (4 leaded – common cathode)							
3900	Red	547.0	20	1.9	20	60°	640
	Yellow	397.0	20	2.0	20	60°	590
	Green	497.0	20	3.2	20	60°	520
FULL COLOR R/G/B (4 leaded – common anode)							
2400	Red	2490.0	20	2.2	20	60°	640
	Green	377.0	20	3.2	20	60°	520
	Blue	1095.0	20	3.3	20	60°	461
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A



5mm Panel Mount LED Assemblies

Package Dimensions



All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	3.5	34000	Contact WLI

Note: Bi-Color, Tri-Color and Full Color not available in AC voltages

How To Order

LED Series	LED Specifications	Resistor Value Code
CRM - <u>X</u> - <u>XXXX</u> - <u>XXXX</u> - I		
	Bipins=0 Leads=1	See LED Chart See Resistor Chart

Special Features

- Front mounting snap-in LED- no mounting hardware required
- Optional resistor in lead
- Custom wire options

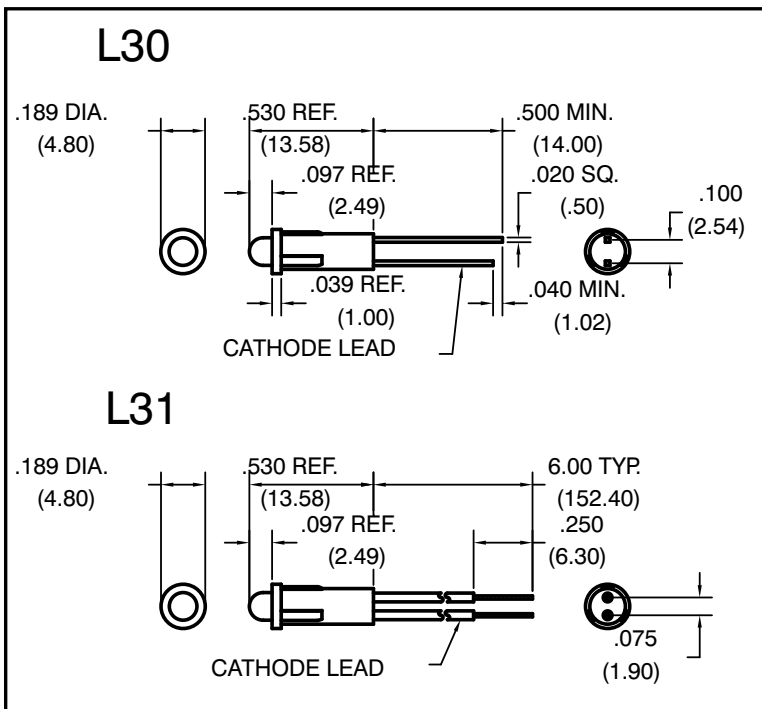
Specifications

- Mounting hole: .158" ± .001" (4.01 ± .03mm)
- Termination: 26AWG UL1061 6.0" (152.4 mm) red (anode) and black(cathode) leads stripped to .250" (6.35 mm) standard or LED pins
- Housing: Black nylon UL94V-2

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
4200	Green	42.0	20	2.2	20	45°	569
4201	Yellow	25.0	20	2.1	20	45°	595
4202	Red	27.0	20	2.1	20	45°	640
LOW CURRENT (Use -0001 for resistor code)							
4203	Green	2.0	2	1.9	2	45°	568
4204	Yellow	1.5	2	1.8	2	45°	585
4205	Red	1.8	2	1.8	2	45°	640
BICOLOR							
4206	Red	40.0	20	2.0	20	40°	640
	Green	55.0	20	2.1	20		568
4207	Amber	50.0	20	2.1	20	40°	610
	Green	60.0	20	2.2	20		568
BLUE							
4208	Blue	800.0	20	3.5	20	35°	460

Package Dimensions



All dimensions are in inches (mm)



3mm Panel Mount LED Assemblies

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	None
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color not available in AC voltages

How To Order

LED Series	Termination	LED Part #	Resistor Value Code
L3	X	XXXX	XXXX
		LED pins=0 Leads=1	See LED Chart See Resistor Chart

Special Features

- Rear mounting friction fit- no mounting hardware require
- Custom housing lengths and lead lengths available
- Optional internal resistor – can be customized for AC applications
- Sealed against moisture and dust - IP66 sealing available
- Fits panel thickness .031" (0.79mm), .060" (1.52 mm)
- .125" (3.18 mm), .187" (4.75 mm), and .220" (5.59 mm)
- Wide selection of wire sizes and types – including Mil Spec MIL-W-22759/33 wire
- Ganged LED assembly with connector built to your spec

Specifications

- Mounting hole: .187" ± .001" (4.75 ± .03 mm)
- Termination: 22AWG UL1061 6.0" (152.4 mm) gray (anode) and black (cathode) leads stripped .250" (6.35 mm) standard or LED pins
- Housing: Black butyrate plastic

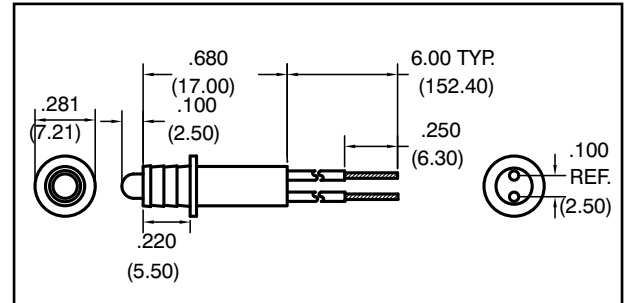
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT (Use -0001 for resistor code)							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A



3mm Panel Mount LED Assemblies

Package Dimensions



All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10		
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4350
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color not available in AC voltages

How To Order

LED Series	LED Part #	Resistor Value Code	Panel Thickness	Sealing Option
L4	X	XXXX	XXXX	S = Standard I = IP66 Seal
	Bipins=0 Leads=1	See LED Chart	See Resistor Chart	
			A=.125" (3.18mm) pnl B=.187" (4.75mm) pnl C=.220" (5.54mm) pnl D=.060" (1.52mm) pnl E=.031" (0.79mm) pnl	

Special Features

- Front mounting, snap-in LED - no mounting hardware required
- Optional resistor in lead
- Fits panel thicknesses from .031" (.787 mm) to .062" (1.574 mm)
- Can be customized for AC applications
- Custom wire and connector options

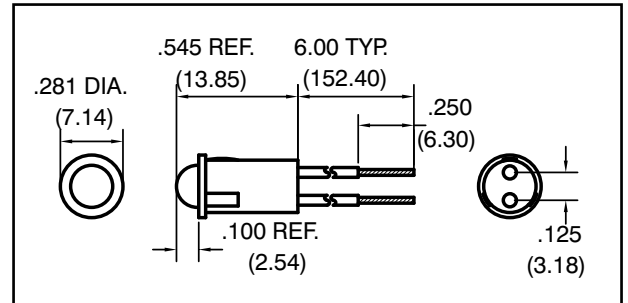
Specifications

- Mounting hole: .250" $\pm$.001" (6.35 $\pm$.03 mm)
- Termination: 22 AWG UL1061 6.0" (152.4 mm) gray (anode) and black (cathode) leads stripped to .250" (6.35 mm) standard or LED pins
- Housing: Black PP



5mm Panel Mount LED Assemblies

Package Dimensions



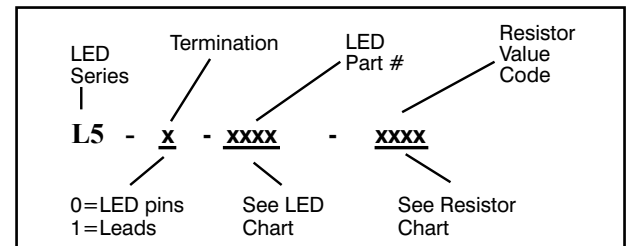
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color not available in AC voltages

How To Order



Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
9102	Red	5.6	10	2.0	20	60°	635
9103	Green	5.6	10	2.2	20	60°	565
9104	Yellow	5.6	10	2.1	20	60°	585
9105	Orange	5.6	10	2.0	20	60°	630
5 V INTERNAL RESISTOR							
9124	Red	16.0	12	5.0	10	60°	625
9125	Yellow	16.0	12	5.0	10	50°	590
9126	Green	16.0	12	5.0	10	50°	565
BICOLOR							
9109	Red	38.0	20	2.0	20	60°	660
	Green	13.0	20	2.2	20		585
9128	Yellow	10.0	20	2.1	20	60°	590
	Green	25.0	20	2.2	20		565
ULTRA BRIGHT – DAYLIGHT READABLE							
9134	Green	148.0	20	2.1	20	60°	574
9135	Blue	198.0	20	3.3	20	60°	468
9136	Red	447.0	20	2.5	20	60°	650
9137	Yellow	397.0	20	2.0	20	60°	590
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4001	Red	248.0	22	5.0	22	60°	660
LOW CURRENT (Use -0001 for resistor code)							
9121	Red	2.0	2	1.7	2	60°	625
9122	Yellow	2.0	2	1.85	2	60°	590
9123	Green	2.0	2	1.9	2	60°	565
BLUE							
9135	Blue	198.0	20	3.3	20	60°	468

Special Features

- Rear mounting, friction fit – no mounting hardware required
- Custom housing lengths and lead lengths available
- Optional internal resistor – can be customized for AC applications
- Sealed against moisture and dust – IP66 sealing available
- Available for panel thickness .062" (1.58 mm), .125" (3.18 mm), and .187" (4.75 mm)
- Wide selection of wire sizes and types – including Mil Spec MIL-W-22759/33 wire
- Ganged LED assembly with connector built to your spec

Specifications

- Mounting hole: .250" ± .001" (6.35 ± 0.03 mm)
- Termination: 22 AWG UL1061 6.0" (152.4 mm) gray (anode) and black (cathode) leads stripped .250" (6.35 mm) standard or LED pins
- Housing: Black butyrate plastic

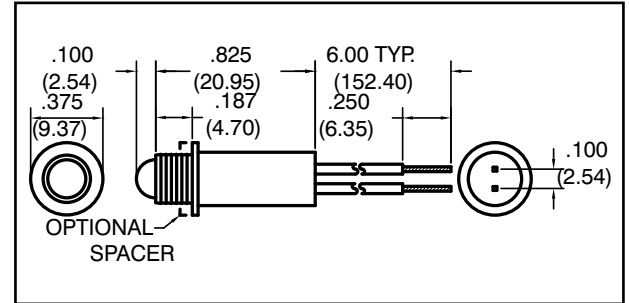
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)	V _f Typ. @ I _f (mA)	Viewing Angle 2 θ ½	Peak Wavelength (nm)		
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT - DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	1200.0	20	3.3	20	30°	515
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BICOLOR (3 leaded - common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
TRICOLOR (4 leaded - common cathode)							
3900	Red	547.0	20	1.9	20	60°	640
	Yellow	397.0	20	2.0	20	60°	590
	Green	497.0	20	3.2	20	60°	520
FULL COLOR R/G/B (4 leaded - common anode)							
2400	Red	2490.0	20	2.2	20	60°	640
	Green	377.0	20	3.2	20	60°	520
	Blue	1095.0	20	3.3	20	60°	461
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A



5mm Panel Mount LED Assemblies

Package Dimensions



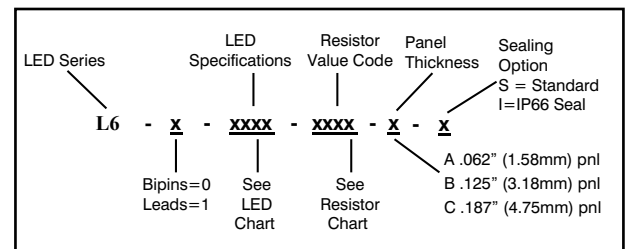
All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4350
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color and Tri-Color not available in AC voltages

How To Order



Special Features

- One piece body and lens construction – available in red, green, blue, amber and clear butyrate plastic
- Front mounting ribbed body “snaps into panel” – no mounting hardware required
- Available in smooth body for thinner panels – mounts with tinnerman nut
- Optional internal resistor- can be customized for AC applications
- Wide selection of wire sizes and types – including Mil Spec MIL-W-22759/33 wire
- Sealed against moisture and dust to meet IP66

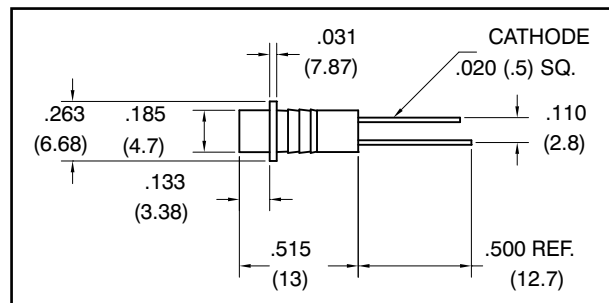
Specifications

- Mounting hole: .187" ± .001" (4.75 ± .03 mm)
- Termination: 26 AWG UL1061 6.0" (152.4mm) red (anode) and black (cathode) leads stripped to .250" (6.35 mm) standard or LED pins
- Housing: Butyrate plastic



3mm Panel Mount LED Assemblies

Package Dimensions



All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4350
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color not available in AC voltages

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT (Use -0001 for resistor code)							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A

How To Order

Lens Style	Lens Color	LED Part#	Resistor Value Code
Ribbed Body=4 Smooth Body=3			
x - x 00 - x - xxxx - xxxx			
Termination Bipins=0 Leads=1	Amber = 1 Red=2 Blue=3 Green=5 Clear=5	See LED Chart	See Resistor Chart

Special Features

- Special part marking available – polarity identification is standard
- Optional internal resistor – can be customized for AC applications
- Choice of body finishes and termination style
- Front mounts with barrel fastener
- Jewelled transparent stovepipe lens provides wide viewing angle

Specifications

- Mounting hole: $.297" \pm .002"$ ($7.54 \pm .05$ mm)
- Termination: 22 AWG UL1061 4.0" (101.6 mm) gray (anode) and black (cathode) leads stripped to $.250"$ (6.35 mm) standard or bipins (gold plated brass)
- Housing Aluminum body available in bright clear or black anodized finish – internally insulated
- Lens: Butyrate plastic

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
4906	Red	20.0	10	2.0	20	60°	627
4907	Green	12.0	10	2.2	20	60°	565
4908	Yellow	6.0	10	2.1	20	60°	583
ULTRA BRIGHT							
4909	Red	50.0	10	2.0	20	30°	627
4910	Green	40.0	10	2.2	20	30°	565
4911	Yellow	35.0	10	2.1	20	30°	590
3044	Blue	60.0	20	3.8	20	20°	430
BLINKING (Operates at 3.5V to 12V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BICOLOR (3 leaded-common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A

Note: 3 leaded bicolor available as leaded assembly only

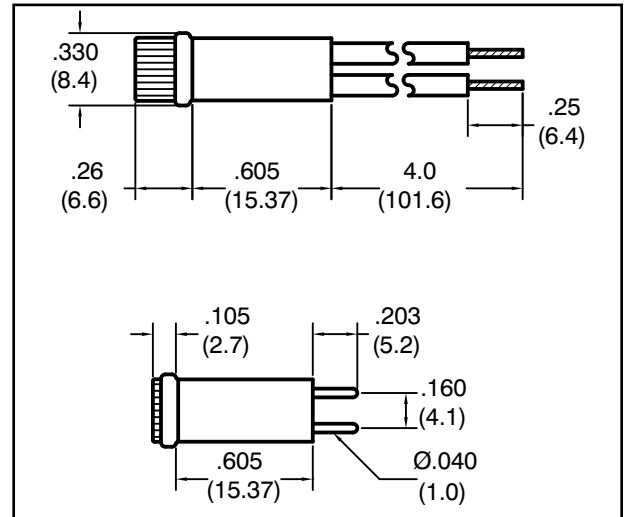
How To Order

Series	LED Part#	Termination	Body Finish	Lens Style	Lens Color	Resistor Value Code
X	XXXX	X	X	X	X	XXXX
Hi-Eff=4 Ultrabright=7	See LED Chart	Bipins=0 Leads=1	0=Bright Clear Anodized 1=Black Anodized	1=Flush 2=Stovepipe	1=Amber 2=Red 3=Blue 4=Green 5=Clear	See Resistor Chart



5mm Panel Mount LED Assemblies

Package Dimensions



All dimensions are in inches (mm)

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4350
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color and Tri-Color not available in AC voltages

Special Features

- Simplified one piece lens and body-mounts with tinnerman nut
- Sealed against moisture and dust to IP66
- Optional internal resistor – can be customized for AC applications
- Part marking and connector options
- Custom wire options – including MilSpec MIL-W-22759/33 wire

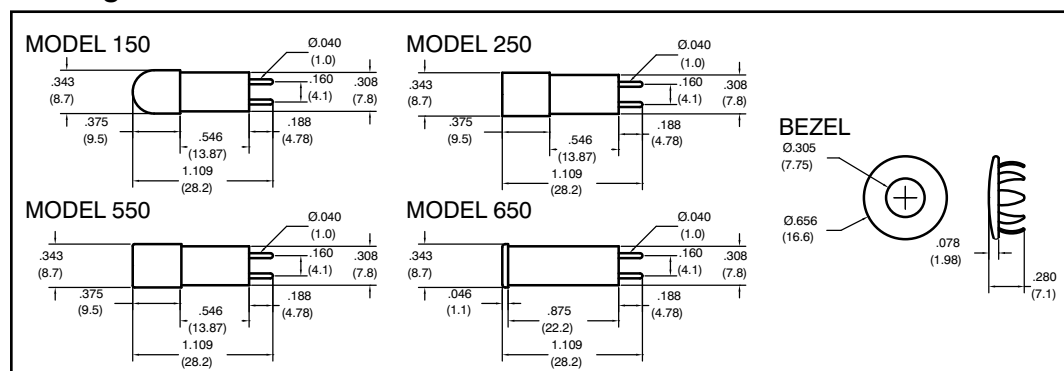
Specifications

- Mounting hole: .312" +.003"/-.001" (7.93 +.08/-.03 mm). With nickel steel bezel .500" ± .002" (12.7 ± .05 mm)
- Termination: 22AWG UL1061 6.0" (152.4 mm) gray (anode) and black (cathode) leads stripped .250" (6.35 mm) standard or bipins (gold plated brass)
- Housing: Butyrate plastic

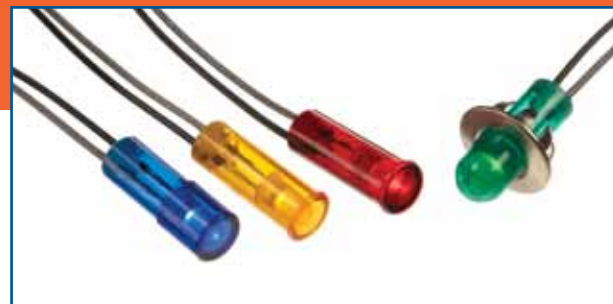
Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT - DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	300.0	20	3.2	20	30°	520
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BICOLOR (3 leaded - common cathode)							
0909	Red	697.0	20	1.95	20	60°	650
	Green	198.0	20	2.1	20		574
0910	Yellow	198.0	20	2.0	20	60°	590
	Green	168.0	20	2.1	20		574
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A

Package Dimensions



All dimensions are in inches (mm)



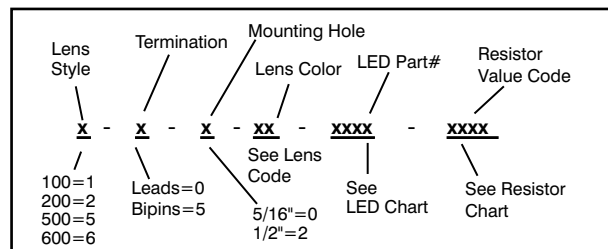
5mm Panel Mount LED Assemblies

Resistor Chart

OPERATING SPECIFICATIONS				
Resistor Value Code	Voltage	Current (mA)	Resistor Value (Ohms) Green, Yellow Red, Bicolor LED	Resistor Value (Ohms) Blue, White LED
0000	2	10 or 20	None	Not Available
9900	5	10	332	
9928	5	10		121
9901	12	10	1000	
9902	12	10		715
9903	24	10	2210	
9904	24	10		1910
9905	28	10	2610	
9906	28	10		2320
9907	5	20	150	
9922	5	20		65
9908	12	20	511	
9909	12	20		357
9910	24	20	1100	
9911	24	20		953
9912	48	9	4870	
9913	48	9		4530
9914	60	7	8250	
9915	60	7		7500
9920	120VAC	8	6490	Contact WLI

Note: Bi-Color and Tri-Color not available in AC Voltages

How To Order



Lens Color Code	
1T=Transparent Amber	1J=Jewelled Amber
2T=Transparent Red	2J=Jewelled Red
3T=Transparent Blue	3J=Jewelled Blue
4T=Transparent Green	4J=Jewelled Green
5T=Transparent Clear	5J=Jewelled Clear

Special Features

- One piece body and lens construction – available in red, green, amber, clear, blue, yellow and white transparent or translucent butyrate plastic
- Front mounting ribbed body “snaps into panel” – no mounting hardware required
- Available in smooth body for thinner panels – mounts with tinnerman nut
- Sealed against moisture and dust to meet IP66
- Part marking available

Specifications

- Mounting hole: .187" $\pm$.001" (4.75 $\pm$.03mm)
- Termination: 26AWG 6.0" (152.4 mm) solid insulated wire leads or bipin
- Housing: Butyrate plastic



Panel Mount Incandescent/Neon Indicators

Lens Color Code

1=Transparent Amber	6=Translucent Yellow ¹
2=Transparent Red	7=Translucent Red ¹
3=Transparent Blue*	8=Translucent Blue* ¹
4=Transparent Green*	9=Translucent Green* ¹
5=Transparent Clear	10=Translucent White ¹

Note: * Blue and green lenses not recommended for use with standard neon lamp

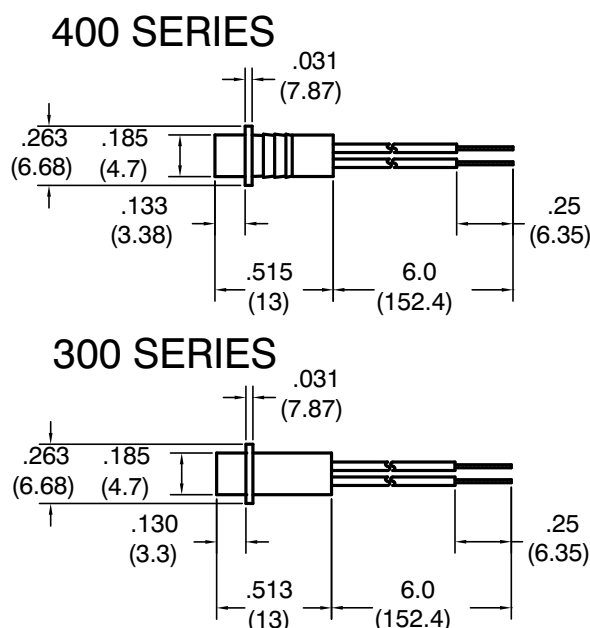
¹Translucent lenses not recommended for use with neon bulbs

Electrical and Optical Characteristics

Incandescent Lamps				
Lamp Type	Voltage	Amps	MSCP (Nominal)	Life Hours (Average)
HM605	5.0	0.021	0.034	10,000
HM609	5.0	0.115	0.150	40,000
HM619	5.0	0.060	0.150	100,000
HM628	12.0	0.060	0.150	16,000
HM630	14.0	0.065	0.150	16,000
HM631	18.0	0.026	0.150	16,000
HM642	28.0	0.024	0.150	16,000

Neon Lamps							
Lamp Type	Circuit Voltage	Starting Voltage (Max)		Current mA	Series Resistor		Life Hours (Average)
		AC	DC		115V	220V	
0800	90-115/220	65	90	0.3	150K Ω	360K Ω	15,000
0801	90-115/220	95	135	1.0	47K Ω	120K Ω	15,000

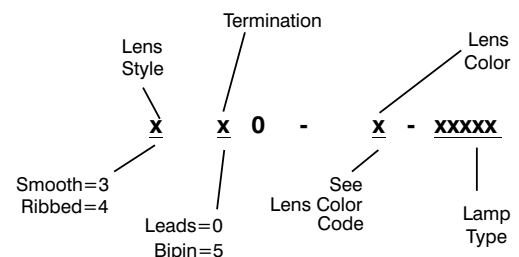
Package Dimensions



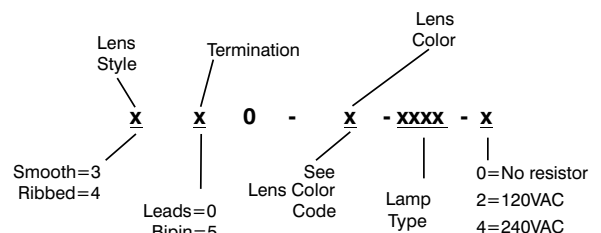
All dimensions are in inches (mm)

How To Order

Incandescent:



Neon:



Special Features

- Simplified one piece lens and body- mounts with tinnerman nut or nickel steel bezel
- Sealed against moisture and dust to meet IP66
- Custom part marking and wire options

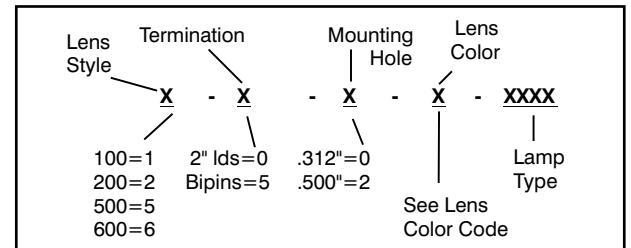
Specifications

- Mounting hole: .312" +.003"/-.001" (7.93 +.08/-.03 mm)
 - With nickel steel bezel .500" ± .002" (12.7 ± .05 mm)
- Termination: 22AWG UL1015 2.0" (50.8 mm) leads or bipins (gold plated brass)
- Housing: Butyrate plastic- transparent or translucent



Panel Mount Incandescent/Neon Indicators

How To Order



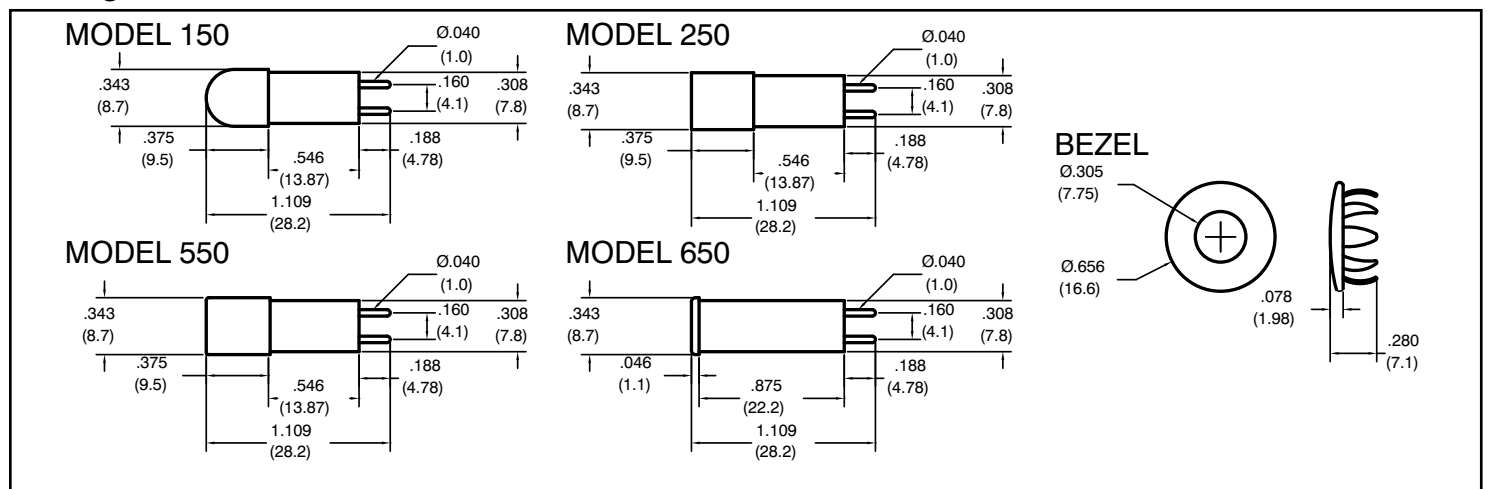
Electrical and Optical Characteristics

Incandescent Lamps			
Lamp Type	Voltage	Amps	Life Hours
H519	2.5	.200	500
M521	6.0	.200	1,000
M522	3.0	.015	10,000
H524	6.3	.200	3,000
M525	6.3	.040	50,000
M526	6.3	.075	500
M527	6.0	.040	10,000
H529	6.3	.200	50,000
H533	14.0	.080	2,500
H538	14.0	.080	50,000
M540	12.0	.040	10,000
M542	18.0	.040	10,000
HM550	28.0	.040	4,000
HM553	28.0	.040	25,000
M555	28.0	.040	50,000
M801	10.0	.014	50,000
M802	10.0	.040	30,000

Lens Color Code	
1=Transparent Amber	6=Translucent Yellow ¹
2=Transparent Red	7=Translucent Red ¹
3=Transparent Blue*	8=Translucent Blue* ¹
4=Transparent Green*	9=Translucent Green* ¹
5=Transparent Clear	10=Translucent White ¹
Note: * Blue and green lenses not recommended for use with standard neon lamp	
¹ Translucent lenses for incandescents only	

Neon Lamps						
Lamp Type	Max Breakdown Voltage		Voltage	Watts	Life Hours	Internal Resistor Attached
	AC	DC				
High Brightness – Dark Starting						
1204(C2A)	45	135	120	1/4	25,000	None *
1211(RC2X)	45	135	120	1/4	25,000	47K
Standard Brightness – Not recommended with Translucent Lens						
1202(A9A)	65	90	120	1/15	25,000	None *
1201(RA9X)	65	90	240	1/15	25,000	100K
* Note: Neon assemblies without resistor attached require a current limiting device in the circuit Green neon lamps also available for use with green lenses						

Package Dimensions



All dimensions are in inches (mm)

Special Features

- Available in two lens styles – flush and stovepipe
- Choice of body finishes and termination style
- Front mounts with barrel fastener
- Special part marking available

Specifications

- Mounting hole: .297" $\pm$.002" (7.54 $\pm$.05 mm)
- Termination: 22AWG UL1015 2.0" (50.8 mm) leads or bipins (gold plated brass)
- Housing: Aluminum body available in bright clear or black anodized finish – internally insulated
- Lens: Butyrate plastic

Electrical and Optical Characteristics

Incandescent Lamps			
Lamp Type	Voltage	Amps	Life Hours
H519	2.5	.200	500
M521	6.0	.200	1,000
M522	3.0	.015	10,000
H524	6.3	.200	3,000
M525	6.3	.040	50,000
M526	6.3	.075	500
M527	6.0	.040	10,000
H529	6.3	.200	50,000
H533	14.0	.080	2,500
H538	14.0	.080	50,000
M540	12.0	.040	10,000
M542	18.0	.040	10,000
HM550	28.0	.040	4,000
HM553	28.0	.040	25,000
M555	28.0	.040	50,000
M801	10.0	.014	50,000
M802	10.0	.040	30,000

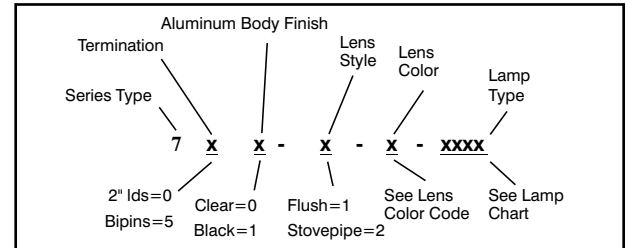
Lens Color Code	
1=Transparent Amber	6=Translucent Yellow ¹
2=Transparent Red	7=Translucent Red ¹
3=Transparent Blue*	8=Translucent Blue* ¹
4=Transparent Green*	9=Translucent Green* ¹
5=Transparent Clear	10=Translucent White ¹
Note: * Blue and green lenses not recommended for use with standard neon lamp	
¹ Translucent lenses for incandescents only	
Neons not available in 750-1 or 751-1 configuration	

Neon Lamps						
Lamp Type	Max Breakdown Voltage		Voltage	Watts	Life Hours	Internal Resistor Attached
	AC	DC				
High Brightness – Dark Starting						
1204(C2A)	45	135	120	1/4	25,000	None *
1211(RC2X)	45	135	120	1/4	25,000	47K
Standard Brightness – Not recommended with Translucent Lens						
1202(A9A)	65	90	120	1/15	25,000	None *
1201(RA9X)	65	90	240	1/15	25,000	100K
* Note: Neon assemblies without resistor attached require a current limiting device in the circuit Green neon lamps also available for use with green lenses						

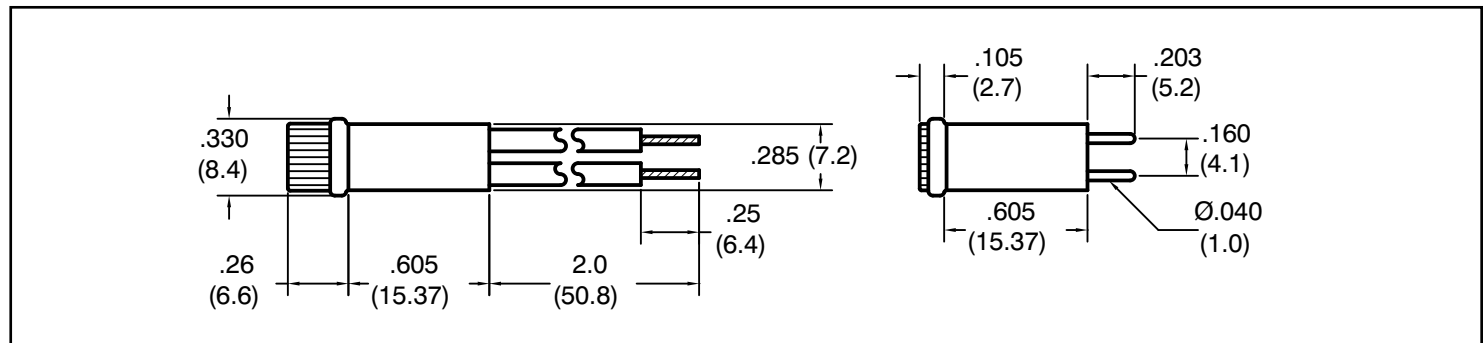


Panel Mount Incandescent/Neon Indicators

How To Order



Package Dimensions



All dimensions are in inches (mm)

Special Features

- Customized to your specifications without tooling charges
 - Variable LED spacing, minimum .180" (4.57 mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 33 T1 LEDs in one convenient assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated

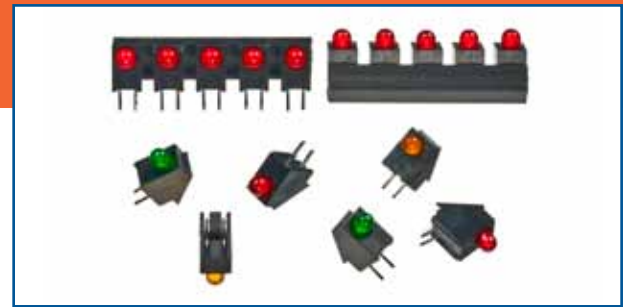
*Patented

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)	V _F Typ. @ I _F (mA)	Viewing Angle 2 θ ½	Peak Wavelength (nm)		
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A

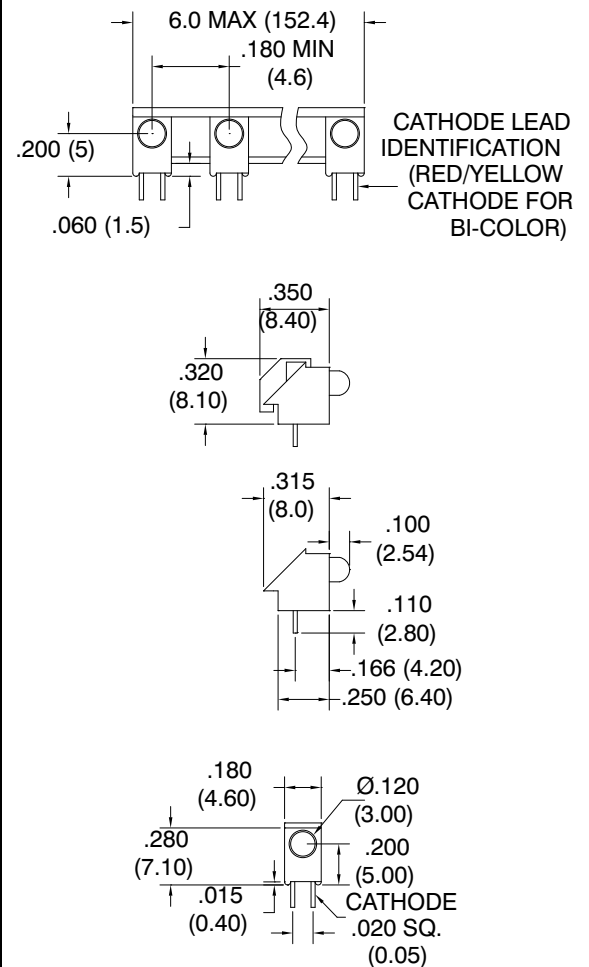
How To Order

Individual RA LEDs				Multiple RA LEDs on a Bar			
RA	x	-	xxxx	# of LEDs Per Bar	x	RA	x - xxxx - xxx
LED Color			See LED Part #		LED Color		LED Part# (Use MCOO for multiple colors)
Red=R					R=Red		Center to Center Spacing of LEDs in inches (If spacing varies use SPL)
Yellow=Y					Y=Yellow		
Green=G					G=Green		
Orange=O					O=Orange		
Blue=L					L=Blue		
Bicolor=B					B=Bicolor		
White=W					W=White		
					M=Multiple		



3mm PC Board Mount LED

Package Dimensions



All dimensions are in inches (mm)
Standard polarity shown in drawing: Cathode right

Special Features

- Customized to your specifications without tooling charges
 - Variable LED spacing, minimum .180" (4.57 mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 33 T1 LEDs in one convenient assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated

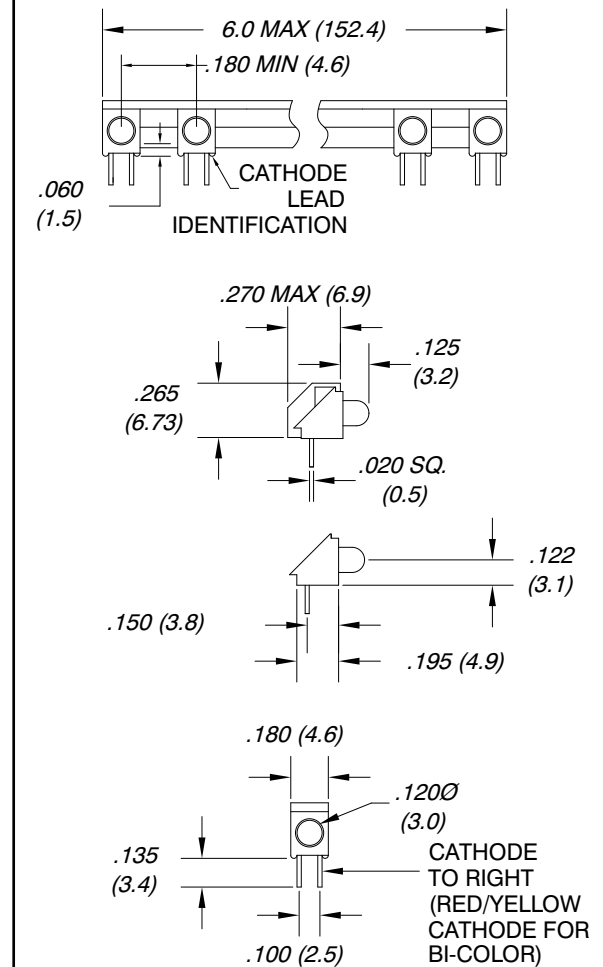
*Patented

3mm PC Board Mount LEDs

Package Dimensions

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A



All dimensions are in inches (mm)
Standard polarity shown in drawing: Cathode right

How To Order

Individual RA LEDs

RA **x** - **xxxx** - 3000
 LED Color: Red=R, Yellow=Y, Green=G, Orange=O, Blue=L, Bicolor=B, White=W
xxxx - See LED Part #

Multiple RA LEDs on a Bar

of LEDs Per Bar **x** RA **x** - **xxxx** - **xxx** - 3000
 LED Color: R=Red, Y=Yellow, G=Green, O=Orange, L=Blue, B=Bicolor, W=White, M=Multiple
xxxx - LED Part# (Use MCOO for multiple colors)
xxx - Center to Center Spacing of LEDs in inches (If spacing varies use SPL)

Special Features

*Patented

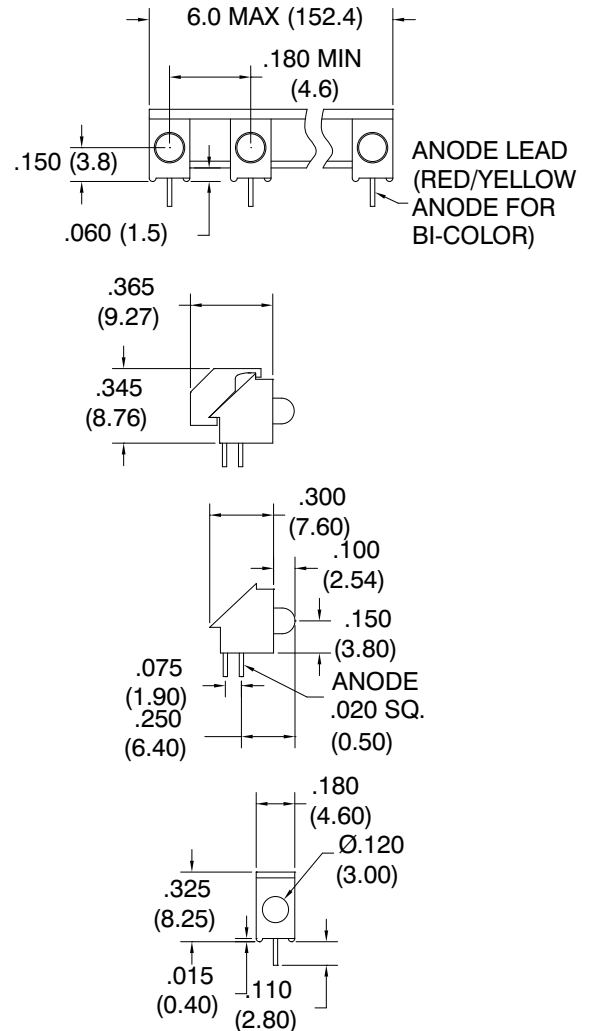
- Customized to your specifications without tooling charges
 - Variable LED spacing, minimum .180" (4.57 mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 33 T1 LEDs in one convenient assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A

3mm PC Board Mount LEDs

Package Dimensions



All dimensions are in inches (mm)
Standard polarity shown in drawing: Cathode to back

How To Order

Individual RA LEDs

RA **X** - **XXXX** - 7400
 LED Color
 Red=R
 Yellow=Y
 Green=G
 Orange=O
 Blue=L
 Bicolor=B
 White=W
 See LED Part #

Multiple RA LEDs on a Bar

X
of LEDs Per Bar
 RA **X** - **XXXX** - **XXX** - 7400
 LED Color
 R=Red
 Y=Yellow
 G=Green
 O=Orange
 L=Blue
 B=Bicolor
 W=White
 M=Multiple
 LED Part# (Use MCOO for multiple colors)
 Center to Center Spacing of LEDs in inches (If spacing varies use SPL)

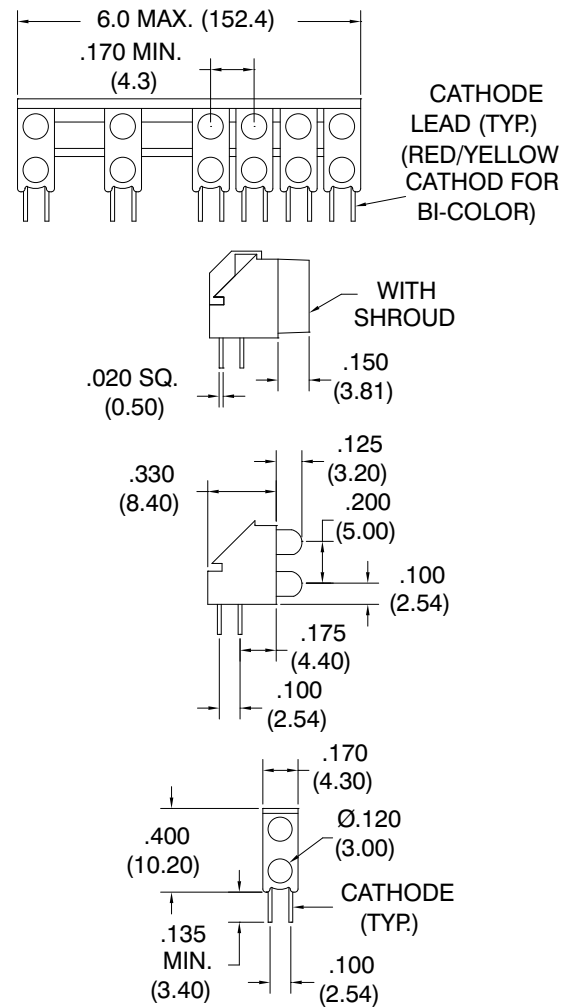
Special Features

- Customized to your specifications without tooling charges
 - Variable LED spacing .170" (4.32mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 33 bilevel T1 LEDs in one assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated
- Shrouded option for backlighting
- Bilevel design saves PC board space

*Patented

3mm PC Board Mount LEDs

Package Dimensions



All dimensions are in inches (mm)
Standard polarity shown in drawing: Cathode right

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1	2	1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A

How To Order

Individual DRA/DRS LEDs			Multiple DRA/DRS LEDs on a Bar				
DR x - xxxx - xxxx			x DR x	- xxxx - xxxx	- xxx		
Standard=A	Top Pos.	Bottom Pos.	# of LEDs Per Bar	Top Pos	Bottom Pos	Center to Center	
Shrouded=S	LED Part#	LED Part#		LED Part#	LED Part#	Spacing of LEDs	
			Standard=A	(Use MCOO for multiple colors)	(Use MCOO for multiple colors)	in inches	
			Shrouded=S			(If spacing varies use SPL)	

Special Features

- Customized to your specifications without tooling charges
 - Variable LED spacing .170" (4.32mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 33 tri-level T1 LEDs in one assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated
- Shrouded option for backlighting
- Tri-level design saves PC board space

*Patented

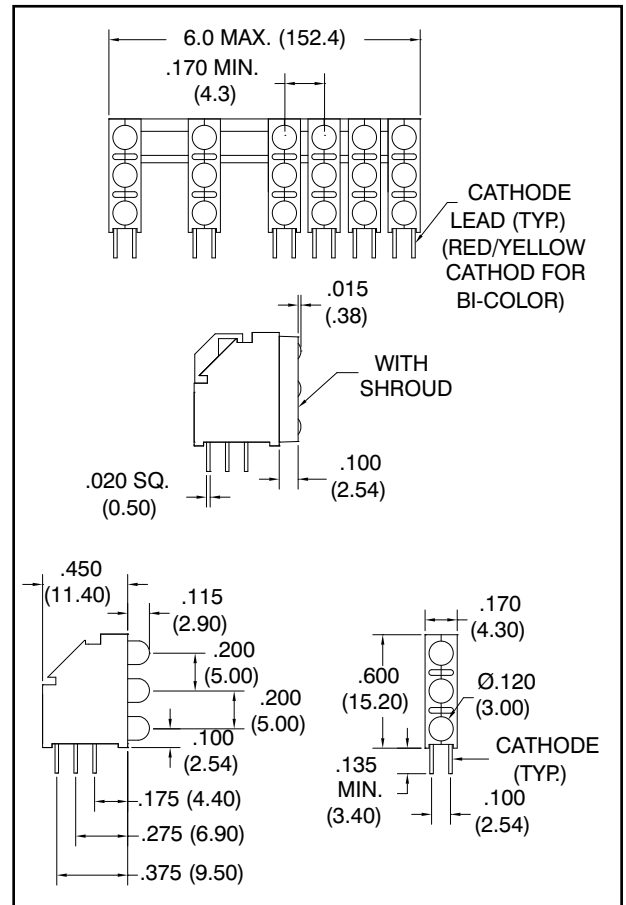


3mm PC Board Mount LEDs

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
LOW CURRENT							
1303	Red	2.1	2	1.7	2	50°	635
1304	Yellow	2.1		1.8	2	50°	583
1305	Green	2.3	2	1.9	2	50°	565
BICOLOR (2 leaded)							
8901	Red	20.0	20	2.0	20	60°	627
	Green	16.0	20	2.2	20		565
8903	Yellow	7.0	20	2.1	20	60°	590
	Green	16.0	20	2.2	20		565
BLUE							
8310	Blue	1100	20	3.3	20	30°	468
ULTRA BRIGHT							
1310	Red	55.0	20	1.9	20	45°	635
1311	Yellow	45.0	20	2.1	20	45°	583
1312	Green	45.0	20	2.2	20	45°	565
1315	Red	45.0	20	1.8	20	60°	645
SUPER ULTRA BRIGHT							
8306	Green	150.0	20	2.2	20	50°	565
8312	Yellow	700.0	20	2.0	20	50°	590
8313	Red	800.0	20	1.85	20	50°	660
WHITE							
1331	White	1600	20	3.3	20	34°	N/A

Package Dimensions

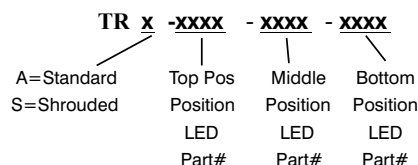


All dimensions are in inches (mm)

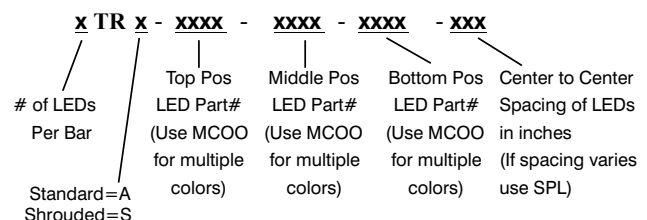
Standard polarity shown in drawing: Cathode right

How To Order

Individual TRA/TRS LEDs



Multiple TRA/TRS LEDs on a Bar



Special Features

- Customized to your specifications without tooling charges
 - Variable LED spacing, minimum, 280" (7.1 mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 22 T1 3/4 LEDs in one convenient assembly
- Bar provides consistent alignment for multiple LED mounting
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-O rated

*Patented

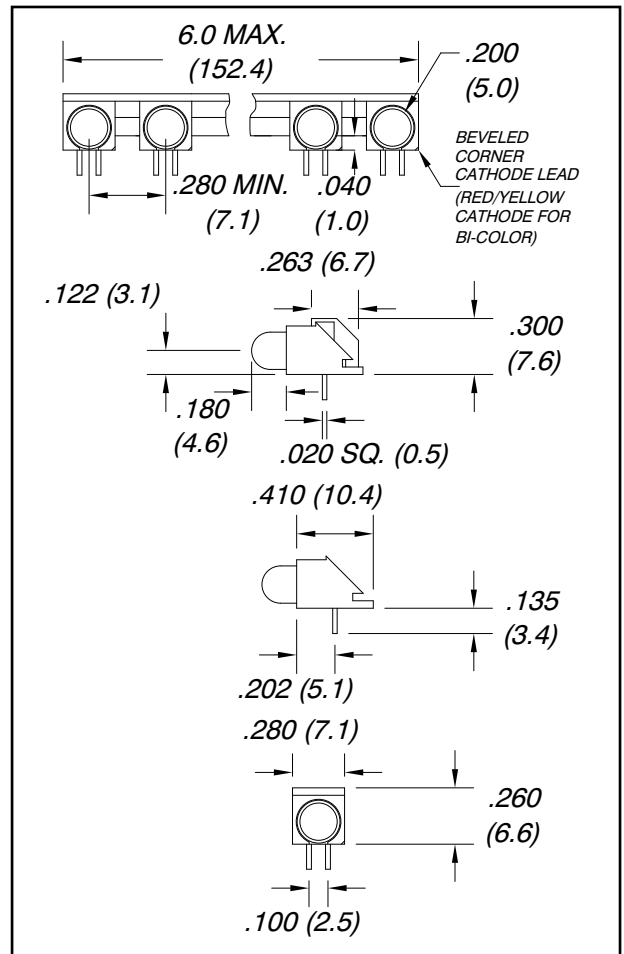


5mm PC Board Mount LEDs

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
ULTRA BRIGHT - DAYLIGHT READABLE							
3056	Red	400.0	20	1.9	20	30°	660
3055	Yellow	400.0	20	2.0	20	30°	590
3054	Green	300.0	20	3.2	20	30°	520
3060	Orange	600.0	20	2.1	20	30°	610
SUPER ULTRA BRIGHT							
3036	Red	2800.0	20	1.85	20	20°	660
3046	Red	900.0	20	1.9	20	30°	626
3047	Green	5490.0	20	3.2	20	20°	520
3048	Amber	1300.0	20	2.02	20	30°	592
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4002	Red	198.0	22	5.0	22	60°	660
BLUE							
3044	Blue	60.0	20	3.8	20	20°	430
3057	Blue	640.0	20	3.3	20	20°	468
WHITE							
3061	White	27000.0	20	3.2	20	15°	N/A
BICOLOR							
9001	Red	30.0	20	2.0	20	60°	627
	Green	20.0	20	2.2	20		565
9002	Yellow	10.0	20	2.1	20	60°	590
	Green	20.0	20	2.2	20		565
5V INTERNAL RESISTOR							
3040	Red	30.0	13	5.0	13	30°	627
3042	Yellow	20.0	13	5.0	13	30°	590
3043	Green	20.0	13	5.0	13	30°	565

Package Dimensions



All dimensions are in inches (mm)

How To Order

Individual RA LEDs				Multiple RA LEDs on a Bar			
RA	x	-	xxxx	x	RA	x	- xxx - xxx
LED Color			See LED Part #	# of LEDs Per Bar	LED Color		LED Part# (Use MCOO for multiple colors)
Red=R					R=Red		
Yellow=Y					Y=Yellow		
Green=G					G=Green		
Orange=O					O=Orange		
Blue=L					L=Blue		
Bicolor=B					B=Bicolor		
White=W					W=White		
					M=Multiple		
							Center to Center Spacing of LEDs in inches (If spacing varies use SPL)

Special Features

*Patented

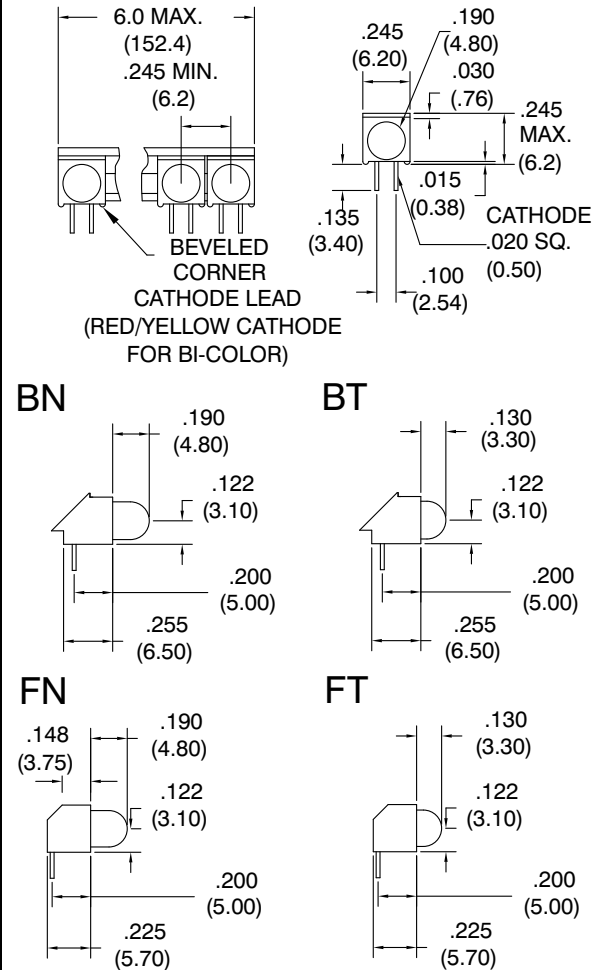
- Customized to your specifications without tooling charges
 - Variable LED spacing, minimum .245" (6.22 mm)
 - Maximum bar length 6.0" (152.4 mm)
- Available with 2 to 24 T1 3/4 LEDs in one convenient assembly
- Bar provides consistent alignment for multiple LED mounting
- Available in two LED configurations - direct cross to industry standard 5mm right angle LED
- Wave solderable and chemically cleanable
- Housing and bar material UL 94V-0 rated

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _F (mA)		V _F Typ. @ I _F (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY							
9102	Red	5.6	10	2.0	20	60°	635
9103	Green	5.6	10	2.2	20	60°	565
9104	Yellow	5.6	10	2.1	20	60°	585
9105	Orange	5.6	10	2.0	20	60°	630
5 V INTERNAL RESISTOR							
9124	Red	16.0	12	5.0	10	60°	625
9125	Yellow	16.0	12	5.0	10	50°	590
9126	Green	16.0	12	5.0	10	50°	565
BICOLOR							
9109	Red	38.0	20	2.0	20	60°	660
	Green	13.0	20	2.2	20		585
9128	Yellow	10.0	20	2.1	20	60°	590
	Green	25.0	20	2.2	20		565
ULTRA BRIGHT – DAYLIGHT READABLE							
9134	Green	148.0	20	2.1	20	60°	574
9135	Blue	198.0	20	3.3	20	60°	468
9136	Red	447.0	20	2.5	20	60°	650
9137	Yellow	397.0	20	2.0	20	60°	590
BLINKING (Operates at 3.5V to 14V, blinking frequency from 3.0Hz to 1.5Hz)							
4001	Red	248.0	22	5.0	22	60°	660
LOW CURRENT							
9121	Red	2.0	2	1.7	2	60°	625
9122	Yellow	2.0	2	1.85	2	60°	590
9123	Green	2.0	2	1.9	2	60°	565

5mm PC Board Mount LEDs

Package Dimensions



All dimensions are in inches (mm)

How To Order

Individual RA LEDs				Multiple RA LEDs on a Bar			
X	X	RA	X - XXXX	X	B	X	RA X - XXXX - XXX
Bar mountable=B	Flat style=F	LED Color	See LED Part#	# of LEDs Per Bar	LED Color	LED Part# (Use MCOO for multiple colors)	Center to Center Spacing of LEDs in inches (If spacing varies use SPL)
Configuration		Red=R		N = .19" (4.8)	R=Red		
N = .19" (4.8)		Yellow=Y		T = .13" (3.3)	Y=Yellow		
T = .13" (3.3)		Green=G			G=Green		
		Orange=O			O=Orange		
		Blue=L			L=Blue		
		Bicolor=B			B=Bicolor		
					M=Multiple		

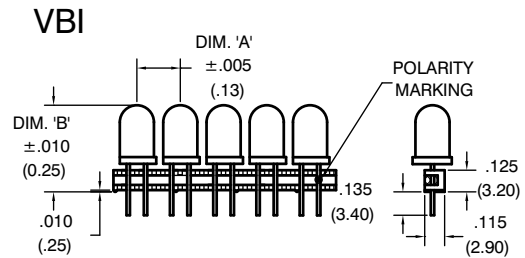
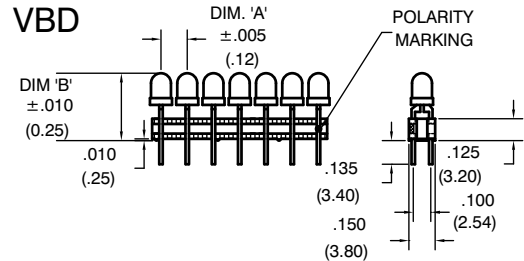
Special Features

*Patented

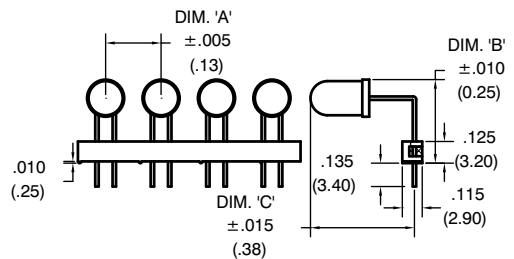
- Mounts series of LEDs in single-in-line or dual-in-line footprint
- Customized to your specifications without tooling charges
 - Center LED spacing in .050" increments or built to your specifications
 - Minimum spacing .100" (2.54 mm)
 - Maximum bar length 3.0" (76.2 mm)
 - Color combinations available at no extra cost
 - Assembly height built to your design
- Any size or type LED can be used- VBI bar holds 3 leaded LEDs
- Bar provides consistent alignment and one-step PC Board mounting
- Bottom standoff facilitates board washing
- Wave solderable and chemically cleanable – bar material UL 94V-O rated
- Polarity identification on bar
- Custom offset and right angle bends available on VBI bar

PC Board Mount LEDs

Package Dimensions



VBI with bend



All dimensions are in inches (mm)

Electrical and Optical Characteristics (TA = 25°C)

LED Part #	Color	Luminous Intensity (mcd) Typ. @ I _f (mA)		V _f Typ. @ I _f (mA)		Viewing Angle 2 θ ½	Peak Wavelength (nm)
HIGH EFFICIENCY T1 (3mm)							
1300	Yellow	6.0	10	2.0	10	60°	583
1301	Red	5.5	10	1.9	10	60°	635
1302	Green	5.0	10	2.1	10	60°	565
1313	Orange	5.5	10	1.9	10	60°	600
HIGH EFFICIENCY T 1 3/4 (5mm)							
3008	Red	11.0	10	1.9	10	60°	635
3019	Green	14.0	10	2.1	10	60°	565
3020	Yellow	8.0	10	2.0	10	60°	583
3022	Orange	7.0	10	1.9	10	60°	600
HIGH EFFICIENCY 2.5 x 5mm (Tombstone)							
5001	Yellow	5.0	10	2.1	20	100°	590
5002	Green	6.0	10	2.2	20	100°	565
5003	Red	10.0	10	2.0	20	100°	627

How To Order

VBI Bar

X - VBI- **XXXX** - **XXX** - **XXX** - VTL - **S**

Number of LEDs per bar

LED Type/Color (See LED Part#)
Use MCOO for multiple colors

Center to Center Spacing of LEDs (Ref: Dim A)
If varies, use SPL

Nominal assembly height off PCB in inches (Ref: Dim B)

S=Standard
X=Special

VBD Bar

X - VBD - **XXXX** - **XXX** - **XXX** - VTL - **S**

Number of LEDs per bar

LED Type/Color (See LED Part#)
Use MCOO for multiple colors

Center to Center Spacing of LEDs (Ref: Dim A)
If varies, use SPL

Nominal assembly height off PCB in inches (Ref: Dim B)

VTL=Vertical
xxx=Bend
Dimension from LED to leads in inches (Ref: Dim C)

S=Standard
X=Special

To support design engineers in selecting the right LED indicator for their design, Wilbrecht Ledco has assembled design kits for panel and printed circuit board mount applications. With a kit, an engineer can test a variety of LEDs in a prototype unit and save considerable time and expense.

Wilbrecht Ledco also builds custom samples to specific requirements for qualified customers.



RoHS Compliant LED Sampler

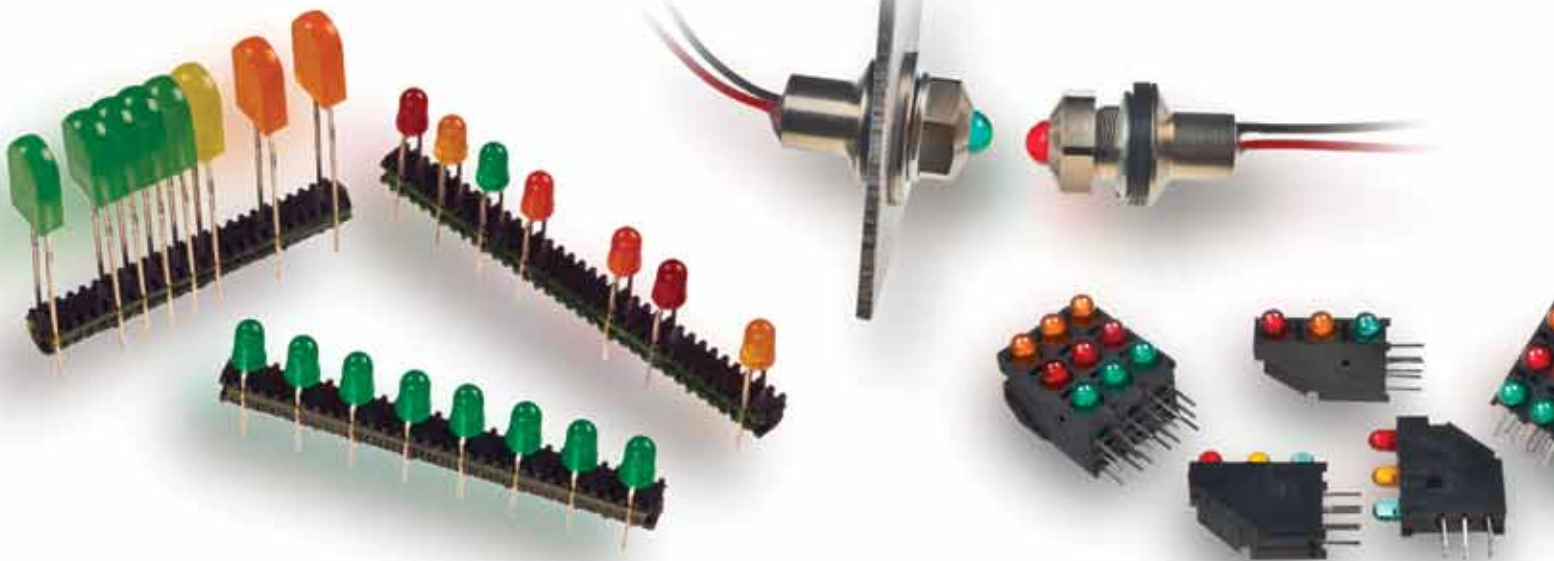
An assortment of RoHS Compliant LED indicators for panel and printed circuit board mount applications. The panel mount kit contains 3mm and 5mm LED indicators in varied colors for a range of mounting hole sizes. Single and bar mount 3mm and 5mm right angle LEDs, as well as vertical LED bars, are supplied in the printed circuit board kit.



New Engineer's Design Kit with Latest Panel Mount LEDs

Wilbrecht Ledco has assembled more than 50 of the most popular, and latest, panel mount LEDs into a single design kit exclusively for engineers. The 3mm to 5mm LED models are all fully assembled indicators ranging in hole sizes from 0.156" to 0.500". Ready for a drop-in fit, the LEDs come with mounting hardware, insulated leads, and are ready for operation in a range of 2V-60VDC and 120VAC.

For additional information on how to incorporate LEDs into your designs, contact Wilbrecht Ledco toll free at 1-888-323-8751 or info@wilbrechtledco.com.



WILBRECHT LEDCO, INC. 1400 Energy Park Dr. ■ Suite 20 ■ St. Paul, MN 55108-5248
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