

Precision Subminiature Lamps



LUMITRON

C O R P O R A T I O N

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Incandescent Lamp or LED?

Why should you consider using an incandescent lamp rather than an LED in your application?

The most significant advantage that incandescent lamps offer over LEDs is the lamps' ability to *cast light*, which LEDs do only in a limited manner. LEDs can only effectively illuminate the area directly in front of them, even when covered by a diffuser or lens.

Incandescent lamps project light in a spherical pattern, allowing you to use them to illuminate objects or information in front of the lamp (as in backlighting applications), to all sides, and below or behind the lamp.

In addition, incandescent lamps offer greater versatility than LEDs:

- Lens ends can be formed in a lamp's glass envelope in order to focus light in a tight and well-defined pattern. Reflectors and/or baffles can also be used to define a lighting pattern that is specific to your needs.
- Color coatings or silicon boots applied to lamps offer a broader range of color options than LEDs.
- Incandescent lamps can operate in a wide range of severe environments.
- Incandescent lamps can be operated on either AC or DC currents (LEDs are DC only), and can withstand current surges or reverse currents that would destroy LEDs in the same circumstances.
- Incandescent lamps can be custom-designed to fit your application's requirements for voltage, current, brightness, and color.
- Incandescent lamps with bases or sockets are easily replaceable.
- Lamps can be re-rated (operated at a voltage or current different from design parameters) to customize their operating characteristics to suit your specific application. Re-rating charts and formulas can be used to accurately predict how other characteristics of a lamp will be affected by re-rating.

Lamp Basics

The information presented here is intended to provide basic information to assist you in specifying the lamp that best suits your application. Note that all performance data for subminiature lamps is based on design voltage, and that these characteristics can be altered significantly by re-rating. If you need a custom lamp design, please call us with your requirements.

Lamp Construction

All Lumitron lamps incorporate tungsten filaments. Because voltage capacity is directly related to filament length, the tungsten filament wire is either coiled or double-coiled in order to fit the greatest possible length of filament within the lamp envelope. Molybdenum support wires are added to lamps with very long filaments to prevent filament sagging when the lamp is on.

Lumitron lamps are constructed for high reliability using the "bead-sealed" method. Dumet (copper-clad alloy) wires are fused within a glass bead, and the filament ends are swaged to the wires. This assembly is then placed in a glass tube, the air is evacuated from the tube, then the tube is sealed to the glass bead to preserve the vacuum within the lamp. The glass bead provides mechanical strength at the base of the lamp where the wires pass through, and ensures a reliable hermetic seal.

The lead wires are tin or gold plated, and the completed lamp is assembled into a base, if required.

Lamp sizes are designated by the letter **T** (indicating tubular construction), followed by a number expressing the approximate glass diameter in eighth-inch increments. For example, a T-1 lamp is constructed using a 1/8 inch maximum (.118 +/- .007 inch, 3mm +/- 0.2 mm) diameter glass envelope.

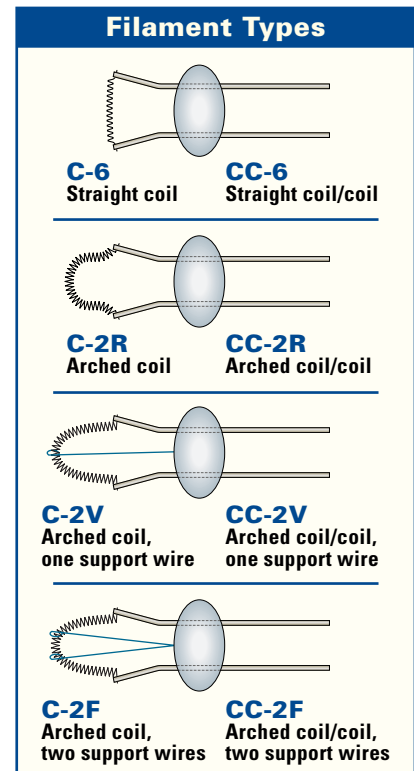
Lamp Terminology

Design Volts: The voltage for which the lamp was originally designed. All other ratings (amperes, brightness, and life) are measured at this voltage, and can be changed by re-rating the voltage.

Design Amperes: The approximate current the lamp will draw at design voltage (stated amperage ratings are plus or minus 10 percent). Wattage can be calculated ($\pm 10\%$) by multiplying design volts by design amperage.

Design Life: The rated average laboratory life when lamps are operated under stable environmental and electrical conditions. Actual life will vary with the particular application. Where lamp replacement is difficult, light output can be sacrificed for longer life. A reduction in the applied voltage (see *Lamp Re-rating on page 16*) will also increase lamp life significantly. Lamp life varies inversely to the 12th power of the ratio of the applied voltage versus the design voltage.

MSCP: Lamp brightness is expressed as Mean Spherical Candlepower (MSCP). MSCP is an industry-wide standard of measurement that effectively integrates and averages the brightness of a lamp in all axes. See *Brightness Measurement* on inside back cover for more information.



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About Lumitron Corporation

Mission Statement

By pursuing a strategy of innovation and support of subminiature lamps, we will work to continually strengthen our position as a reliable link in the display technology value chain while remaining a customer-focused, entrepreneurial company that is flexible and responsive to rapidly changing demands.

• Support...

Lumitron has been building subminiature incandescent lamps to the most stringent military, commercial, and customer specifications since 1970. Many of our customers have had a long history of adding value to their applications by using our products. They can count on us to continue doing so because we maintain our production specifications and manufacturing capabilities to meet old and new drawing requirements, up to the latest revision level.

• Innovation...

Vertical integration—from design, to assembly, to testing—allows us to offer custom lighting solutions quickly. If your application calls for unique dimensions, basing, color coating, filament design, aging and selecting, etc., we can help. Our many years of experience can often produce off-the-shelf answers to otherwise frustrating lighting problems. This can lower or eliminate custom design cost, and since we have a large inventory of standard lamps in stock, we can usually minimize lead times.

• Reliability...

The quality control system in effect at Lumitron is documented by procedures approved to MIL-I-45208. The calibration system is designed to meet MIL-STD-45662, and test and measurement equipment is traceable to the National Institute of Standards and Technology (N.I.S.T.). Based on lot size, an acceptable quality level (AQL) as called out in MIL-STD-105, and statistical process control (SPC) type sampling, applies to all shipments. This includes electrical parameters, mechanical dimensions, and photometric inspection reports with performance data and control charts. Other testing can be performed to meet special customer requirements; inspection data and test reports are retained on file and available for review. Certificate of Conformance available upon request.

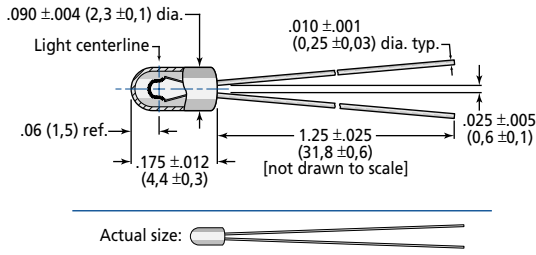
• Flexibility...

Options described later in this catalog—ranging from extended aging to color coating of lamps to meet a particular chromaticity tolerance—are always available. We can also assign part numbers, or unique suffixes to existing part numbers, that lock in precise specifications to assure that the lamps we supply meet your specific requirements.

Bright ideas from Lumitron—for products that brighten the future.

T-3/4 Subminiature Incandescent Lamps

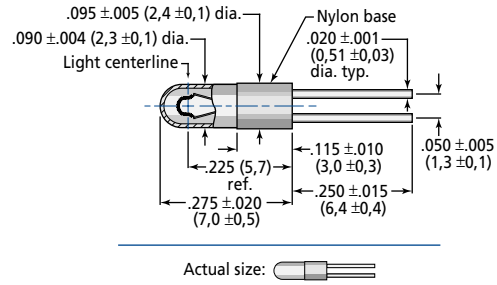
T-3/4 Wire Terminal



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-7100 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7101 |
| 5.0 | .020 | .015 | 1,000 | C-2R | L-8537 |
| 5.0 | .020 | .020 | 20,000 | CC-6 | L-2404 |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6803 ⁽¹⁾⁽²⁾ |
| 5.0 | .034 | .021 | 10,000 | CC-6 | L-2400 |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-6833 ⁽¹⁾⁽²⁾ |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7133 ⁽¹⁾ |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6153 ⁽²⁾ |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-8666 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7153 ⁽¹⁾⁽²⁾ |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-419 |
| 5.0 | .20 | .115 | 5,000 | C-2R | L-7102 |

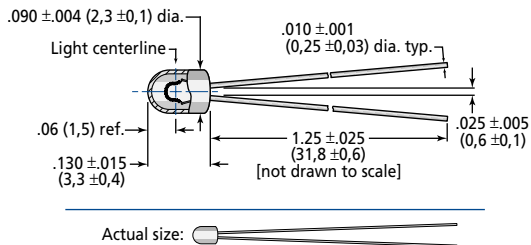
⁽¹⁾ MS90452 ⁽²⁾ MIL-L-6363/4

T-3/4 Bi-Pin



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-7810 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7811 |
| 5.0 | .020 | .015 | 1,000 | C-2R | L-7538 |
| 5.0 | .020 | .020 | 20,000 | CC-6 | L-2404/BP |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-7112 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7113 |
| 5.0 | .034 | .021 | 10,000 | CC-6 | L-2400/BP |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-7114 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7116 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-7115 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-7117 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7118 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-901 |
| 5.0 | .20 | .115 | 5,000 | C-2R | L-7119 |

T-3/4 Short Wire Terminal



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2/S |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6803/S |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-6833/S |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6153/S |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7133/S |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7153/S |

Options and Finishes

Color coating (see inside back cover)
add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Lead and Pin Finishes

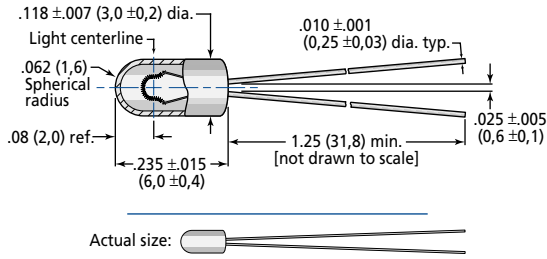
Wire Terminal and Integral Bi-Pin: Leads or pins tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add **GPL** to part number.

Bi-Pin: Pins gold plated .00020 min. per MIL-G-45204, unless unfinished nickel pins are specified. For pins tinned per MIL-STD-202, Method 208, add **TPL** to part number.

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Wire Terminal

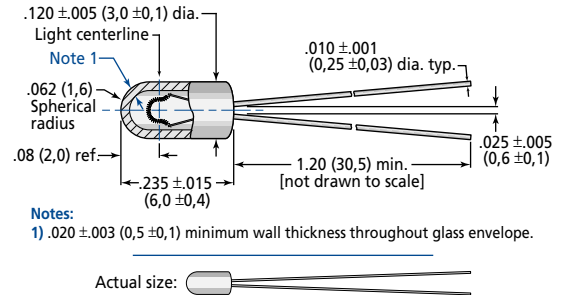


| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|-------------------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-7200 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7201 |
| 1.5 | .015 | .060 | 100,000 | C-2R | L-7202 |
| 1.5 | .030 | .075 | 16,000 | C-2R | L-7203 |
| 2.5 | .210 | .320 | 5,000 | C-2R | L-8711 |
| 3.0 | .001 | .008 | 10,000 | C-2V | L-7204 |
| 3.0 | .005 | .013 | 10,000 | C-2R | L-2128 |
| 3.0 | .020 | .015 | 5,000 | C-2R | L-7205 |
| 3.0 | .020 | .024 | 10,000 | C-2F | L-7206 |
| 3.0 | .027 | .040 | 10,000 | C-2R | L-3037 |
| 3.0 | .030 | .060 | 100,000 | C-2R | L-7207 |
| 3.0 | .150 | .120 | 16,000 | C-2R | L-7208 |
| 5.0 | .020 | .015 | 10,000 | C-2F | L-7209 |
| 5.0 | .020 | .020 | 20,000 | C-2R | L-3043 |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-6022 |
| 5.0 | .030 | .030 | 16,000 | C-2F | L-7210 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-680 ⁽¹⁾⁽²⁾ |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-683 ⁽¹⁾⁽²⁾ |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-713 ⁽¹⁾ |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6150 ⁽²⁾ |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-7211 |
| 5.0 | .150 | .115 | 40,000 | CC-6 | L-716 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-715 ⁽¹⁾⁽²⁾ |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-7215 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7213 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-7214 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-7216 |
| 10.0 | .100 | .027 | 10,000 | C-2F | L-7218 |
| 12.0 | .100 | .030 | 10,000 | C-2F | L-3023 |
| 12.0 | .150 | .060 | 10,000 | C-2F | L-7219 |
| 14.0 | .150 | .040 | 10,000 | C-2F | L-3228 |
| 14.0 | .150 | .065 | 10,000 | C-2F | L-8111 |
| 18.0 | .150 | .026 | 10,000 | C-2F | L-7220 |
| 28.0 | .050 | .020 | 25,000 | CC-2F | L-3091 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-6838 |

⁽¹⁾ MS24367 ⁽²⁾ MIL-L-6363/5

T-1 Wire Terminal

Helium Retardant



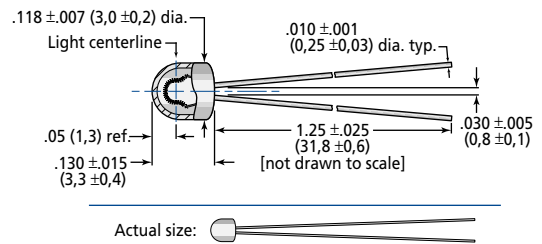
Notes:

1) .020 ± .003 (0,5 ± 0,1) minimum wall thickness throughout glass envelope.

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|-----------------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6806 ⁽¹⁾ |
| 5.0 | .050 | .060 | 40,000 | C-2R | L-6807 ⁽¹⁾ |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-6808 ⁽¹⁾ |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-6809 ⁽¹⁾ |

⁽¹⁾ MS27571

T-1 Short Wire Terminal



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802 ⁽¹⁾⁽²⁾ |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832 ⁽¹⁾⁽²⁾ |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132 ⁽¹⁾⁽²⁾ |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152 ⁽²⁾ |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-6212 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152 ⁽¹⁾⁽²⁾ |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-119 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7212 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-481 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-8175 |
| 14.0 | .150 | .040 | 1,000 | CC-2F | L-7008 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009 ⁽²⁾ |

⁽¹⁾ MS90451 ⁽²⁾ MIL-L-6363/5

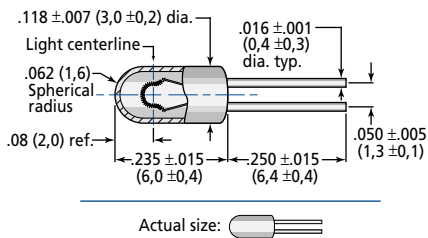
See Page 2 for Options and Finishes

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Integral Bi-Pin

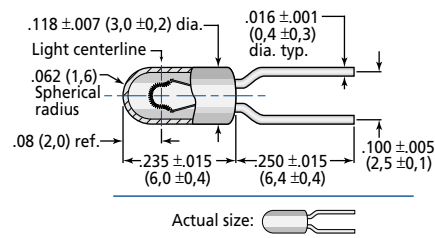
.050" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-6022/IBP5 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-680/IBP5 |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-683/IBP5 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-713/IBP5 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6150/IBP5 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-715/IBP5 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-6838/IBP5 |

T-1 Integral Bi-Pin

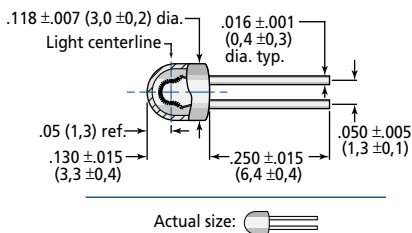
.100" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-6022/IBP10 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-680/IBP10 |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-683/IBP10 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-713/IBP10 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6150/IBP10 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-715/IBP10 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-6838/IBP10 |

T-1 Short Integral Bi-Pin

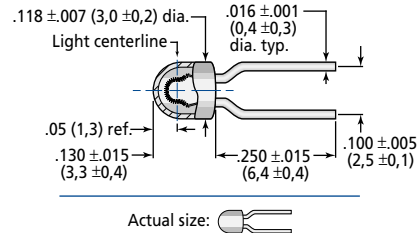
.050" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/IBP5 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/IBP5 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/IBP5 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/IBP5 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/IBP5 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/IBP5 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/IBP5 |

T-1 Short Integral Bi-Pin

.100" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/IBP10 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/IBP10 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/IBP10 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/IBP10 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/IBP10 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/IBP10 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/IBP10 |

Options and Finishes

Color coating (see inside back cover)
add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Lead and Pin Finishes

Wire Terminal and Integral Bi-Pin: Leads or pins tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add **GPL** to part number.

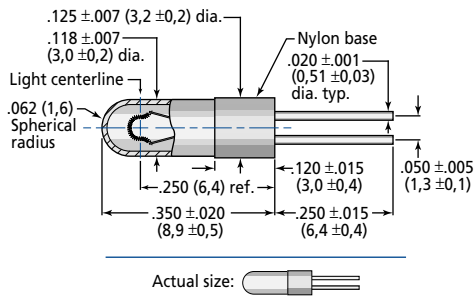
Bi-Pin: Pins gold plated .00020 min. per MIL-G-45204, unless unfinished nickel pins are specified. For pins tinned per MIL-STD-202, Method 208, add **TPL** to part number.

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Bi-Pin

.050" leg spacing

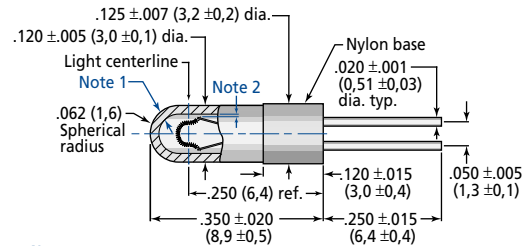


Actual size:

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-3255 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7254 |
| 1.5 | .015 | .060 | 100,000 | C-2R | L-7202/BP5 |
| 1.5 | .030 | .075 | 16,000 | C-2R | L-7255 |
| 2.5 | .210 | .320 | 5,000 | C-2R | L-8757 |
| 3.0 | .001 | .008 | 10,000 | C-2V | L-7204/BP5 |
| 3.0 | .005 | .013 | 10,000 | C-2R | L-7259 |
| 3.0 | .020 | .015 | 5,000 | C-2R | L-3229 |
| 3.0 | .020 | .024 | 10,000 | C-2F | L-7206/BP5 |
| 3.0 | .027 | .040 | 10,000 | C-2R | L-3037/BP5 |
| 3.0 | .030 | .060 | 100,000 | C-2R | L-7260 |
| 3.0 | .150 | .120 | 16,000 | C-2R | L-7261 |
| 5.0 | .020 | .015 | 10,000 | C-2F | L-7209/BP5 |
| 5.0 | .020 | .020 | 20,000 | C-2R | L-3043/BP5 |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-7022 |
| 5.0 | .030 | .030 | 16,000 | C-2F | L-7263 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7680 |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-7683 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7714 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-7265 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-7266 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7715 |
| 5.0 | .150 | .115 | 40,000 | CC-6 | L-7716 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-919 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7267 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-922 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-7268 |
| 10.0 | .100 | .027 | 10,000 | C-2F | L-8095 |
| 12.0 | .100 | .030 | 10,000 | C-2F | L-3023/BP5 |
| 12.0 | .150 | .060 | 10,000 | C-2F | L-8097 |
| 14.0 | .150 | .040 | 10,000 | C-2F | L-3228/BP5 |
| 14.0 | .150 | .065 | 10,000 | C-2F | L-8098 |
| 18.0 | .150 | .026 | 10,000 | C-2F | L-8099 |
| 28.0 | .050 | .020 | 25,000 | CC-2F | L-3091/BP5 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-7839 |

T-1 Bi-Pin

.050" leg spacing Helium Retardant



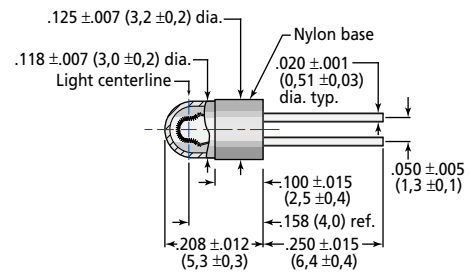
- Notes:
 1) .020 ±.003 (0,5 ±0,1) minimum wall thickness throughout glass envelope.
 2) .010 (0,3) minimum clearance throughout glass envelope.

Actual size:

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7270 |
| 5.0 | .050 | .060 | 40,000 | C-2R | L-7271 |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-7272 |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-7274 |

T-1 Short Bi-Pin

.050" leg spacing



Actual size:

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/BP5 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/BP5 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/BP5 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/BP5 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/BP5 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-6212/BP5 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/BP5 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-119/BP5 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7212/BP5 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-481/BP5 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-8175/BP5 |
| 14.0 | .150 | .040 | 1,000 | CC-2F | L-7008/BP5 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/BP5 |

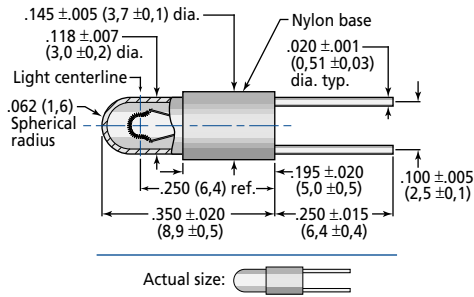
See Page 4 for Options and Finishes

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Bi-Pin

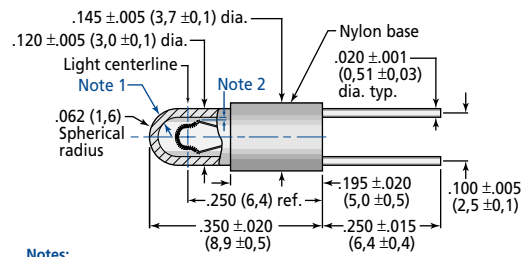
.100" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-3255/BP10 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7254/BP10 |
| 1.5 | .015 | .060 | 100,000 | C-2R | L-7202/BP10 |
| 1.5 | .030 | .075 | 16,000 | C-2R | L-7255/BP10 |
| 2.5 | .210 | .320 | 5,000 | C-2R | L-7257/BP10 |
| 3.0 | .001 | .008 | 10,000 | C-2V | L-7204/BP10 |
| 3.0 | .005 | .013 | 10,000 | C-2R | L-7259/BP10 |
| 3.0 | .020 | .015 | 5,000 | C-2R | L-3229/BP10 |
| 3.0 | .020 | .024 | 10,000 | C-2F | L-7206/BP10 |
| 3.0 | .027 | .040 | 10,000 | C-2R | L-3037/BP10 |
| 3.0 | .030 | .060 | 100,000 | C-2R | L-7260/BP10 |
| 3.0 | .150 | .120 | 16,000 | C-2R | L-7261/BP10 |
| 5.0 | .020 | .015 | 10,000 | C-2F | L-7209/BP10 |
| 5.0 | .020 | .020 | 20,000 | C-2R | L-3043/BP10 |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-7022/BP10 |
| 5.0 | .030 | .030 | 16,000 | C-2F | L-7263/BP10 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7680/BP10 |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-7683/BP10 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7714/BP10 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-7265/BP10 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-7266/BP10 |
| 5.0 | .150 | .115 | 40,000 | CC-6 | L-7716/BP10 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7715/BP10 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-919/BP10 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7267/BP10 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-922/BP10 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-7268/BP10 |
| 10.0 | .100 | .027 | 10,000 | C-2F | L-8095/BP10 |
| 12.0 | .100 | .030 | 10,000 | C-2F | L-3023/BP10 |
| 12.0 | .150 | .060 | 10,000 | C-2F | L-8097/BP10 |
| 14.0 | .150 | .040 | 10,000 | C-2F | L-3228/BP10 |
| 14.0 | .150 | .065 | 10,000 | C-2F | L-8098/BP10 |
| 18.0 | .150 | .026 | 10,000 | C-2F | L-8099/BP10 |
| 28.0 | .050 | .020 | 25,000 | CC-2F | L-3091/BP10 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-7839/BP10 |

T-1 Bi-Pin

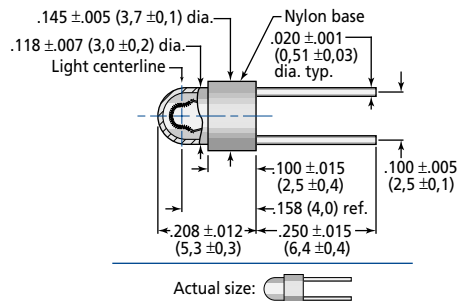
.100" leg spacing Helium Retardant



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7270/BP10 |
| 5.0 | .050 | .060 | 40,000 | C-2R | L-7271/BP10 |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-7272/BP10 |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-7274/BP10 |

T-1 Short Bi-Pin

.100" leg spacing



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/BP10 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/BP10 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/BP10 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/BP10 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/BP10 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-6212/BP10 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/BP10 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-119/BP10 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7212/BP10 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-481/BP10 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-8175/BP10 |
| 14.0 | .150 | .040 | 1,000 | CC-2F | L-7008/BP10 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/BP10 |

Also available with high-temperature (FRP) base material to resist damage when pins are soldered.

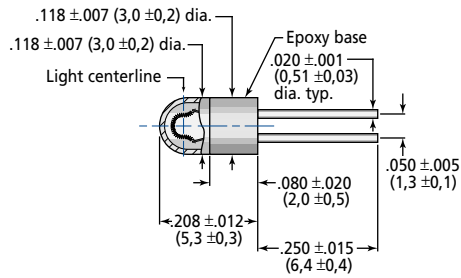
See Page 7 for Options and Finishes

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Short Bi-Pin (EB Type)

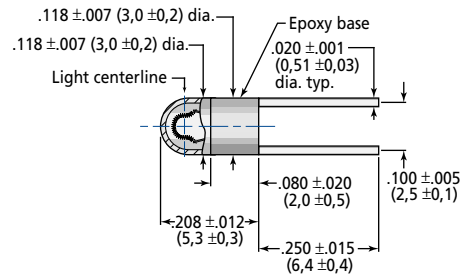
.050" leg spacing



Actual size:

T-1 Short Bi-Pin (EB Type)

.100" leg spacing



Actual size:

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/EB5 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/EB5 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/EB5 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/EB5 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/EB5 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-6212/EB5 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/EB5 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-119/EB5 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7212/EB5 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-481/EB5 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-8175/EB5 |
| 14.0 | .150 | .040 | 1,000 | CC-2F | L-7008/EB5 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/EB5 |

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .020 | 10,000 | C-2R | L-2022/EB10 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-6802/EB10 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-6832/EB10 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6152/EB10 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-7132/EB10 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-6212/EB10 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7152/EB10 |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-119/EB10 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7212/EB10 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-481/EB10 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-8175/EB10 |
| 14.0 | .150 | .040 | 1,000 | CC-2F | L-7008/EB10 |
| 28.0 | .150 | .024 | 1,500 | CC-2F | L-7009/EB10 |

EB-style bi-pin lamps have a molded epoxy base. Because the base diameter is flush with the bulb diameter, these lamps can fit in tighter spaces than similar bi-pin lamps with nylon bases.

Options and Finishes

Color coating (see inside back cover)
add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.
Silicon Booted: see inside back cover.
Special bases or leads: Call with your requirements.

Lead and Pin Finishes

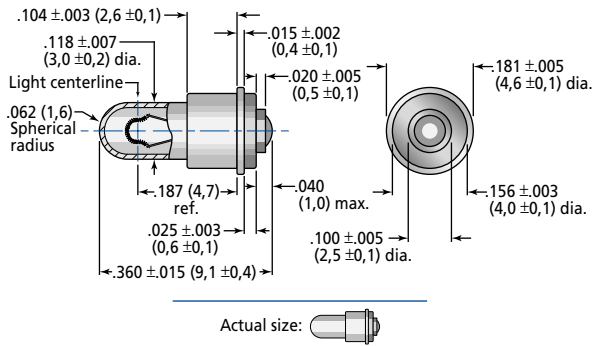
Wire Terminal and Integral Bi-Pin: Leads or pins tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add **GPL** to part number.

Bi-Pin: Pins gold plated .00020 min. per MIL-G-45204, unless unfinished nickel pins are specified. For pins tinned per MIL-STD-202, Method 208, add **TPL** to part number.

Drawing dimensions in inches (mm).

T-1 Subminiature Incandescent Lamps

T-1 Midget Flange

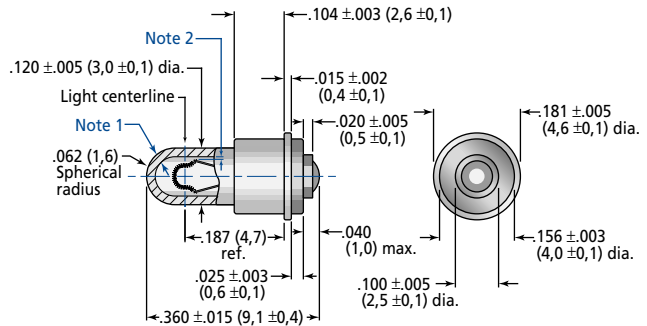


| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------------------|
| 1.5 | .002 | .010 | 10,000 | C-2R | L-7225 |
| 1.5 | .010 | .015 | 5,000 | C-2R | L-7226 |
| 1.5 | .015 | .060 | 100,000 | C-2R | L-7227 |
| 1.5 | .030 | .075 | 16,000 | C-2R | L-8102 |
| 2.5 | .210 | .320 | 5,000 | C-2R | L-7248 |
| 3.0 | .001 | .008 | 10,000 | C-2V | L-7228 |
| 3.0 | .005 | .013 | 10,000 | C-2R | L-679 |
| 3.0 | .020 | .015 | 5,000 | C-2R | L-7229 |
| 3.0 | .020 | .024 | 10,000 | C-2F | L-7230 |
| 3.0 | .027 | .040 | 10,000 | C-2R | L-3038 |
| 3.0 | .030 | .060 | 100,000 | C-2R | L-7231 |
| 3.0 | .150 | .120 | 16,000 | C-2R | L-7232 |
| 5.0 | .020 | .015 | 10,000 | C-2F | L-7233 |
| 5.0 | .020 | .020 | 20,000 | C-2R | L-3044 |
| 5.0 | .030 | .020 | 10,000 | C-2R | L-8022 |
| 5.0 | .030 | .030 | 16,000 | C-2F | L-7234 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-682 ⁽¹⁾⁽³⁾ |
| 5.0 | .050 | .060 | 60,000 | C-2R | L-685 ⁽¹⁾⁽³⁾ |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-714 ⁽¹⁾⁽³⁾ |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-6180 |
| 5.0 | .150 | .080 | 5,000 | C-2R | L-7235 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-718 ⁽¹⁾⁽³⁾ |
| 5.0 | .190 | .115 | 5,000 | C-2R | L-7238 |
| 5.0 | .200 | .115 | 5,000 | C-2R | L-7237 |
| 5.0 | .220 | .115 | 5,000 | C-2R | L-7236 |
| 5.0 | .220 | .125 | 5,000 | C-2R | L-7239 |
| 10.0 | .100 | .027 | 10,000 | C-2F | L-7240 |
| 12.0 | .100 | .030 | 10,000 | C-2F | L-3024 |
| 12.0 | .150 | .060 | 10,000 | C-2F | L-32 |
| 14.0 | .150 | .040 | 10,000 | C-2F | L-9256 |
| 14.0 | .150 | .065 | 10,000 | C-2F | L-8112 |
| 18.0 | .150 | .026 | 10,000 | C-2F | L-7241 |
| 28.0 | .050 | .020 | 25,000 | CC-2F | L-3092 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-6839 ⁽²⁾⁽³⁾ |

⁽¹⁾ MS24515 ⁽²⁾ MS3338 ⁽³⁾ MIL-L-6363/6

T-1 Midget Flange

Helium Retardant



- Notes:
 1) .020 ±.003 (0,5 ±0,1) minimum wall thickness throughout glass envelope.
 2) .010 (0,3) minimum clearance throughout glass envelope.

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|----------------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-930 |
| 5.0 | .050 | .060 | 40,000 | C-2R | L-931 |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-933 ⁽¹⁾ |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-932 ⁽¹⁾ |

⁽¹⁾ MS21376

Options and Finishes

Color coating (see inside back cover)
 add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Finishes

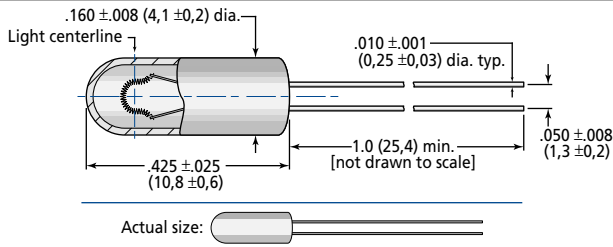
Wire Terminal: Leads tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add GPL to part number.

Midget Flange: Nickel plated brass shell with black phenolic insulation.

Drawing dimensions in inches (mm).

T-1¼ Subminiature Incandescent Lamps

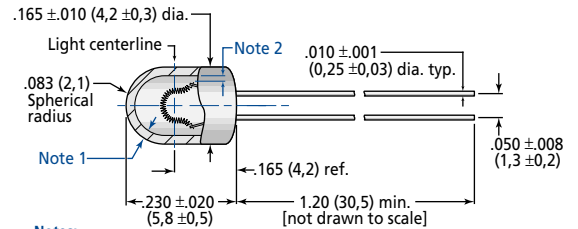
T-1¼ Wire Terminal



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 3.0 | .250 | .190 | 350 | C-2R | L-324 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-580 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-583 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-4003 |
| 5.0 | .130 | .060 | 3,000 | C-2R | L-2114 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-515 |
| 6.0 | .630 | .200 | 1,000 | C-2R | L-634 |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-8610 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-8608 |
| 12.0 | .150 | .060 | 16,000 | C-2F | L-8672 |
| 12.0 | .240 | .075 | 5,000 | C-2F | L-8676 |
| 14.0 | .150 | .065 | 12,000 | C-2F | L-8680 |
| 14.0 | .500 | .080 | 1,000 | C-2F | L-8640 |
| 28.0 | .320 | .040 | 1,000 | C-2F | L-8627 |

T-1¼ Wire Terminal

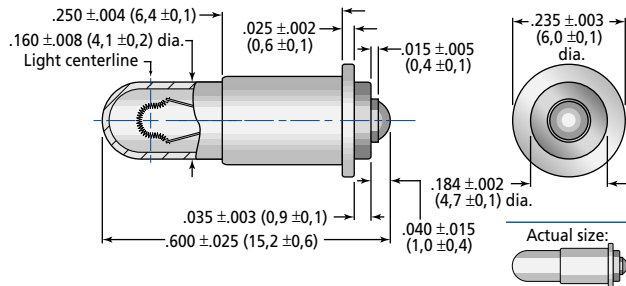
Helium Retardant



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|-----------------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-1189 ⁽¹⁾ |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-1190 ⁽¹⁾ |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-1191 ⁽¹⁾ |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-8515 ⁽¹⁾ |

⁽¹⁾ MS27570

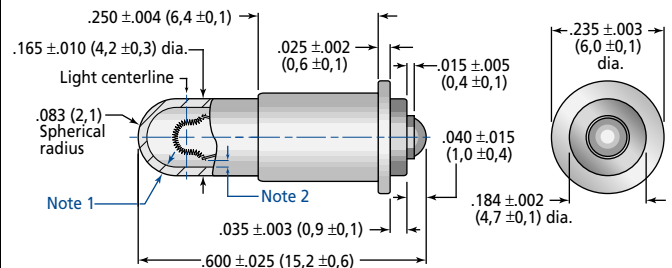
T-1¼ Midget Flange



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 3.0 | .250 | .190 | 350 | C-2R | L-8637 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-3582 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-3585 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-4004 |
| 5.0 | .130 | .060 | 3,000 | C-2R | L-8541 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-3518 |
| 6.0 | .630 | .200 | 1,000 | C-2R | L-8628 |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-8551 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-8609 |
| 12.0 | .150 | .060 | 16,000 | C-2F | L-8673 |
| 12.0 | .240 | .075 | 5,000 | C-2F | L-8677 |
| 14.0 | .150 | .065 | 12,000 | C-2F | L-8681 |
| 14.0 | .500 | .080 | 1,000 | C-2F | L-8646 |
| 28.0 | .320 | .040 | 1,000 | C-2F | L-8632 |

T-1¼ Midget Flange

Helium Retardant



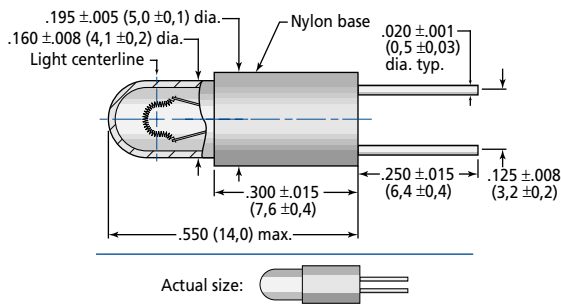
| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-1406 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-1408 |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-1410 |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-1412 |

See Page 8 for Options and Finishes

Drawing dimensions in inches (mm).

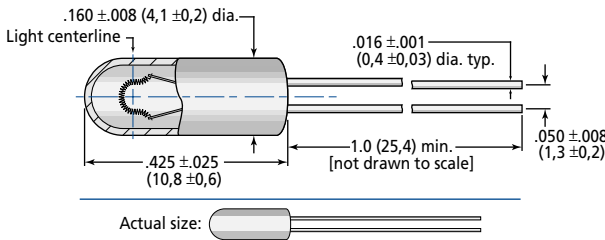
T-1¼ Subminiature Incandescent Lamps

T-1¼ Bi-Pin



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 3.0 | .250 | .190 | 350 | C-2R | L-7637 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7580 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-7583 |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-4003/BP |
| 5.0 | .130 | .060 | 3,000 | C-2R | L-7309 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7515 |
| 6.0 | .630 | .200 | 1,000 | C-2R | L-7628 |
| 6.3 | .550 | .200 | 5,000 | C-2F | L-7310 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-7311 |
| 12.0 | .150 | .060 | 16,000 | C-2F | L-8675 |
| 12.0 | .240 | .075 | 5,000 | C-2F | L-8678 |
| 14.0 | .150 | .065 | 12,000 | C-2F | L-8683 |
| 14.0 | .500 | .080 | 1,000 | C-2F | L-7646 |
| 28.0 | .320 | .040 | 1,000 | C-2F | L-7632 |

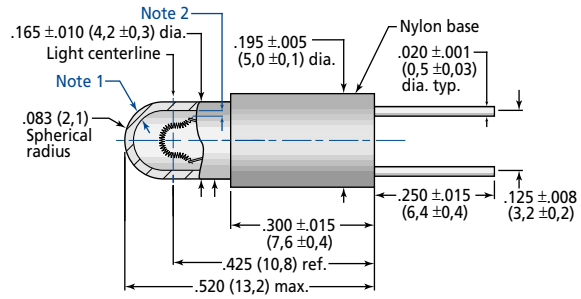
T-1¼ Integral Bi-Pin



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-580/IBP |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-583/IBP |
| 5.0 | .090 | .075 | 25,000 | C-2R | L-4003/IBP |
| 5.0 | .130 | .060 | 3,000 | C-2R | L-2114/IBP |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-515/IBP |
| 6.0 | .630 | .200 | 1,000 | C-2R | L-634/IBP |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-8610/IBP |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-8608/IBP |
| 12.0 | .150 | .060 | 16,000 | C-2F | L-8672/IBP |
| 12.0 | .240 | .075 | 5,000 | C-2F | L-8676/IBP |
| 14.0 | .150 | .065 | 12,000 | C-2F | L-8680/IBP |
| 14.0 | .500 | .080 | 1,000 | C-2F | L-8640/IBP |
| 28.0 | .320 | .040 | 1,000 | C-2F | L-8627/IBP |

T-1¼ Bi-Pin

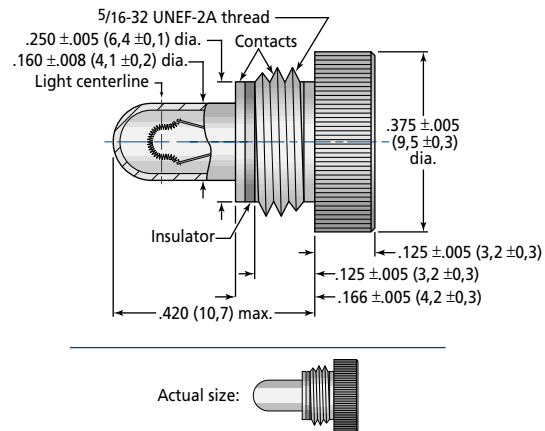
Helium Retardant



- Notes:
 1) .021 ±.003 (0,5 ±0,1) minimum wall thickness throughout glass envelope.
 2) .010 (0,3) minimum clearance throughout glass envelope.

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-1407 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-1409 |
| 5.0 | .090 | .075 | 16,000 | C-2R | L-1411 |
| 5.0 | .150 | .115 | 16,000 | C-2R | L-1413 |

T-1¼ Knurled Screw



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------------------|
| 3.0 | .250 | .190 | 350 | C-2R | L-323 ⁽¹⁾⁽²⁾ |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-3581 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-3584 |
| 5.0 | .130 | .060 | 3,000 | C-2R | L-8543 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-351 |
| 6.0 | .630 | .200 | 1,000 | C-2R | L-8639 ⁽¹⁾⁽²⁾ |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-8553 |
| 14.0 | .500 | .080 | 1,000 | C-2F | L-8654 |
| 28.0 | .320 | .040 | 1,000 | C-2F | L-8623 ⁽¹⁾⁽²⁾ |

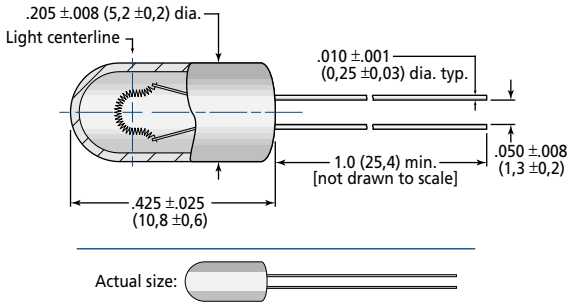
⁽¹⁾ MS25236-323 ⁽²⁾ MIL-L-6363/7

See Page 11 for Options and Finishes

Drawing dimensions in inches (mm).

T-1 $\frac{3}{4}$ Subminiature Incandescent Lamps

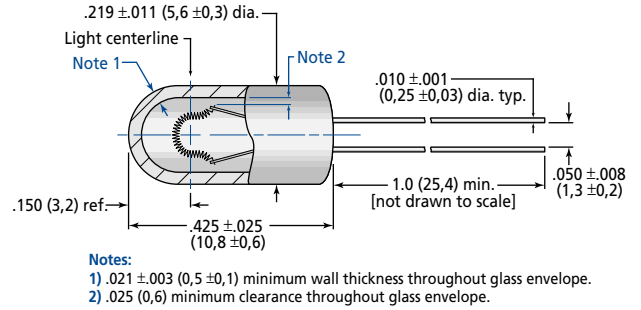
T-1 $\frac{3}{4}$ Wire Terminal



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 2.5 | .220 | .200 | 500 | C-2R | L-1783 |
| 2.7 | .040 | .060 | 6,000 | C-2R | L-1738 |
| 3.0 | .003 | .015 | 10,000 | C-6 | L-2158 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-8805 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-2200 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-3151 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-2203 |
| 6.0 | .030 | .040 | 10,000 | C-2V | L-1730 |
| 6.0 | .600 | .200 | 1,000 | C-2R | L-1784 |
| 6.3 | .020 | .040 | 20,000 | C-2V | L-2180 |
| 6.3 | .230 | .075 | 1,000 | C-2R | L-1739 |
| 6.3 | .400 | .200 | 20,000 | C-2F | L-2181 |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-2112 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-1869 |
| 10.0 | .080 | .040 | 5,000 | C-2F | L-2107 |
| 12.0 | .120 | .040 | 10,000 | C-2F | L-2174 |
| 14.0 | .300 | .080 | 40,000 | C-2F | L-2182 |
| 14.0 | .500 | .080 | 1,500 | C-2F | L-1705 |
| 14.0 | .500 | .100 | 10,000 | C-2F | L-2162 |
| 18.0 | .150 | .040 | 10,000 | C-2F | L-2102 |
| 22.0 | .300 | .040 | 2,000 | C-2F | L-8425 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-6033 |
| 28.0 | .150 | .040 | 10,000 | C-2F | L-2185 |
| 28.0 | .300 | .040 | 7,000 | C-2F | L-2187 |
| 28.0 | .340 | .040 | 4,000 | C-2F | L-1764 |
| 28.0 | .600 | .060 | 5,000 | C-2F | L-361 |

T-1 $\frac{3}{4}$ Wire Terminal

Helium Retardant



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|-----------------------|
| 5.0 | .340 | .200 | 15,000 | C-2R | L-1428 ⁽¹⁾ |

⁽¹⁾ MS27569

Options and Finishes

Color coating (see inside back cover)
add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Lead and Pin Finishes

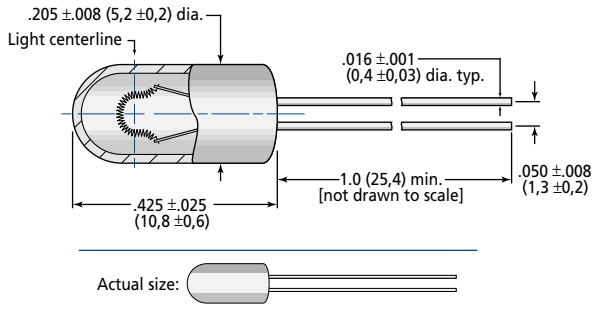
Wire Terminal and Integral Bi-Pin: Leads or pins tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add **GPL** to part number.

Bi-Pin: Pins gold plated .00020 min. per MIL-G-45204, unless unfinished nickel pins are specified. For pins tinned per MIL-STD-202, Method 208, add **TPL** to part number.

Drawing dimensions in inches (mm).

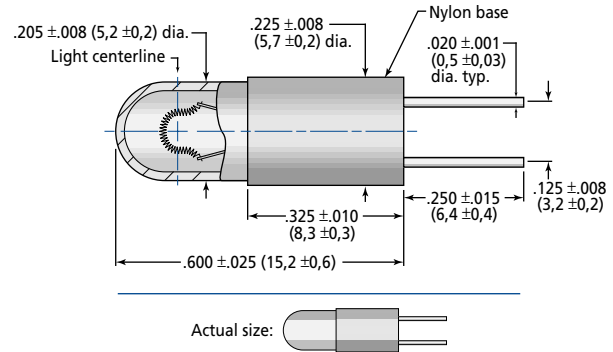
T-13/4 Subminiature Incandescent Lamps

T-13/4 Integral Bi-Pin



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .030 | .060 | 60,000 | C-2R | L-8805/IBP |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-2200/IBP |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-3151/IBP |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-2203/IBP |
| 6.0 | .600 | .200 | 1,000 | C-2R | L-1784/IBP |
| 6.3 | .400 | .200 | 20,000 | C-2F | L-2181/IBP |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-2112/IBP |
| 10.0 | .080 | .040 | 5,000 | C-2F | L-2107/IBP |
| 14.0 | .300 | .080 | 40,000 | C-2F | L-2182/IBP |
| 14.0 | .500 | .080 | 1,500 | C-2F | L-1705/IBP |
| 14.0 | .500 | .100 | 10,000 | C-2F | L-2162/IBP |
| 18.0 | .150 | .040 | 10,000 | C-2F | L-2102/IBP |
| 28.0 | .150 | .040 | 10,000 | C-2F | L-2185/IBP |
| 28.0 | .300 | .040 | 7,000 | C-2F | L-2187/IBP |
| 28.0 | .340 | .040 | 4,000 | C-2F | L-1764/IBP |
| 28.0 | .600 | .060 | 5,000 | C-2F | L-361/IBP |

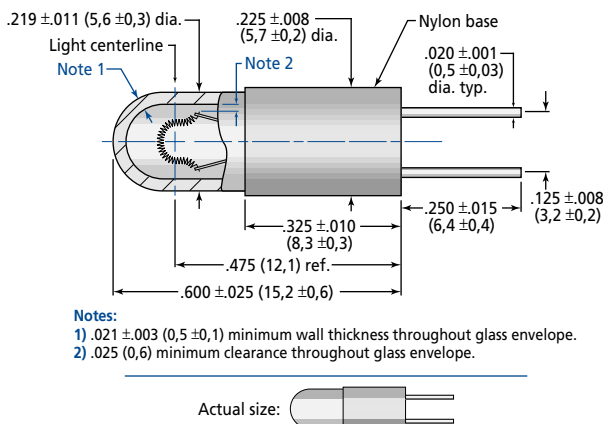
T-13/4 Bi-Pin



| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 2.5 | .220 | .200 | 500 | C-2R | L-7968 |
| 2.7 | .040 | .060 | 6,000 | C-2R | L-7838 |
| 3.0 | .003 | .015 | 10,000 | C-6 | L-7375 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7360 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-7361 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-3149 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7362 |
| 6.0 | .030 | .040 | 10,000 | C-2V | L-7945 |
| 6.0 | .600 | .200 | 1,000 | C-2R | L-7328 |
| 6.3 | .020 | .040 | 20,000 | C-2V | L-7380 |
| 6.3 | .230 | .075 | 1,000 | C-2R | L-7708 |
| 6.3 | .400 | .200 | 20,000 | C-2F | L-7381 |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-7349 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-7344 |
| 10.0 | .080 | .040 | 5,000 | C-2F | L-7367 |
| 12.0 | .120 | .040 | 10,000 | C-2F | L-7371 |
| 14.0 | .300 | .080 | 40,000 | C-2F | L-7382 |
| 14.0 | .500 | .080 | 1,500 | C-2F | L-7330 |
| 14.0 | .500 | .100 | 10,000 | C-2F | L-7373 |
| 18.0 | .150 | .040 | 10,000 | C-2F | L-7370 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-7034 |
| 28.0 | .150 | .040 | 10,000 | C-2F | L-7474 |
| 28.0 | .300 | .040 | 7,000 | C-2F | L-7387 |
| 28.0 | .340 | .040 | 4,000 | C-2F | L-7327 |

T-13/4 Bi-Pin

Helium Retardant



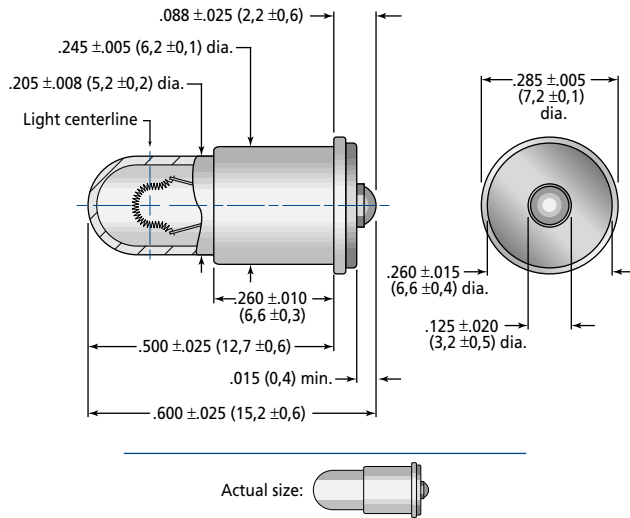
| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 5.0 | .340 | .200 | 15,000 | C-2R | L-7339 |

See Page 13 for Options and Finishes

Drawing dimensions in inches (mm).

T-1³/₄ Subminiature Incandescent Lamps

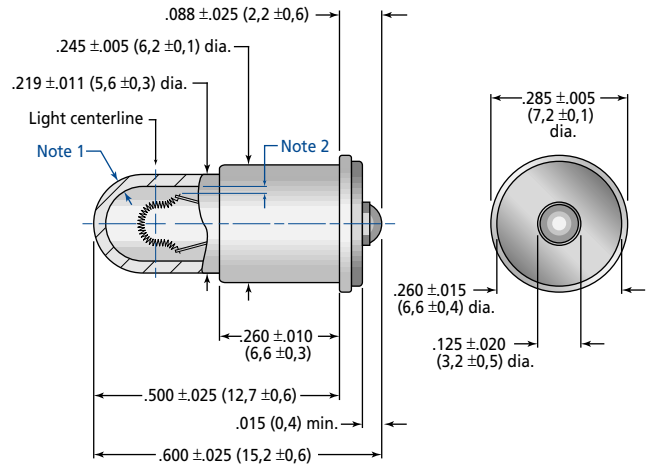
T-1³/₄ Midget Flange



Actual size:

T-1³/₄ Midget Flange

Helium Retardant



Notes:

- 1) .021 ± .003 (0,5 ± 0,1) minimum wall thickness throughout glass envelope.
- 2) .025 (0,6) minimum clearance throughout glass envelope.

Actual size:

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------------------|
| 2.5 | .220 | .200 | 500 | C-2R | L-368 ⁽³⁾ |
| 2.7 | .040 | .060 | 6,000 | C-2R | L-338 ⁽¹⁾⁽³⁾ |
| 3.0 | .003 | .015 | 10,000 | C-6 | L-375 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7332 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-7333 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-3150 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7335 |
| 6.0 | .030 | .040 | 10,000 | C-2V | L-345 |
| 6.0 | .340 @ 5.0V | .200 | 1,000 | C-2R | L-328 ⁽¹⁾⁽³⁾ |
| 6.3 | .020 | .040 | 20,000 | C-2V | L-380 |
| 6.3 | .230 | .075 | 1,000 | C-2R | L-8668 |
| 6.3 | .400 | .200 | 20,000 | C-2F | L-381 ⁽¹⁾⁽³⁾ |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-349 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-344 |
| 10.0 | .080 | .040 | 5,000 | C-2F | L-367 |
| 12.0 | .120 | .040 | 10,000 | C-2F | L-394 |
| 14.0 | .300 | .080 | 40,000 | C-2F | L-382 |
| 14.0 | .500 | .080 | 1,500 | C-2F | L-330 |
| 14.0 | .500 | .100 | 10,000 | C-2F | L-8918 ⁽¹⁾⁽³⁾ |
| 18.0 | .150 | .040 | 10,000 | C-2F | L-370 |
| 28.0 | .150 | .040 | 10,000 | C-2F | L-385 ⁽³⁾ |
| 28.0 | .300 | .040 | 7,000 | C-2F | L-387 ⁽²⁾⁽³⁾ |
| 28.0 | .340 | .040 | 4,000 | C-2F | L-327 ⁽¹⁾⁽³⁾ |
| 28.0 | .600 | .060 | 5,000 | C-2F | L-365 |

⁽¹⁾ MS25237 ⁽²⁾ MS18209 ⁽³⁾ MIL-L-6363/8

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|----------------------|
| 5.0 | .340 | .200 | 15,000 | C-2R | L-339 ⁽¹⁾ |

⁽¹⁾ MS27569

Options and Finishes

Color coating (see inside back cover)
add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Finishes

Wire Terminal and Integral Bi-Pin: Leads or pins tinned per MIL-STD-202, Method 208. For gold plating .00020 min. per MIL-G-45204, add **GPL** to part number.

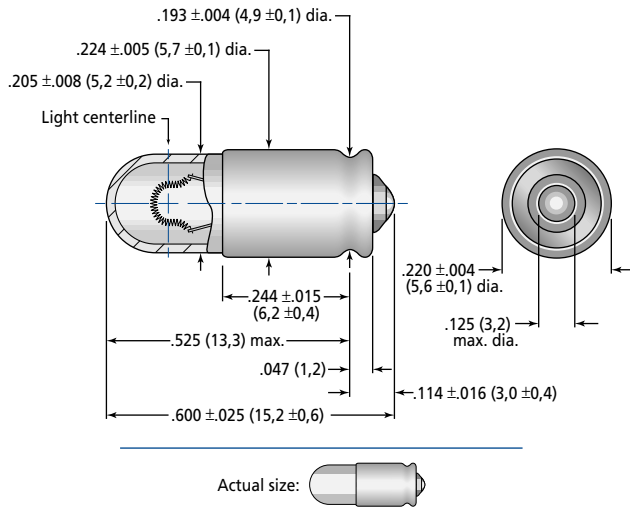
T-1³/₄ Bi-Pin: Unfinished nickel pins are standard. For pins gold plated .00020 min. per MIL-G-45204, add **GPL** to part number. For pins tinned per MIL-STD-202, Method 208, add **TPL** to part number.

Midget Flange: Nickel plated brass shell with black phenolic insulation.

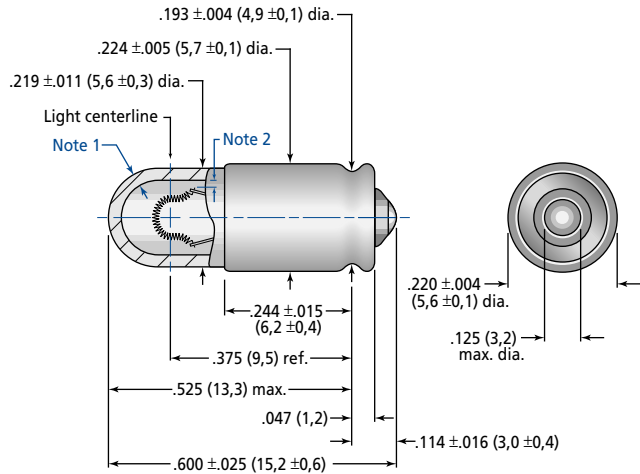
Drawing dimensions in inches (mm).

T-1³/₄ Subminiature Incandescent Lamps

T-1³/₄ Midget Groove



T-1³/₄ Midget Groove Helium Retardant



- Notes:
 1) .021 ± .003 (0,5 ± 0,1) minimum wall thickness throughout glass envelope.
 2) .025 (0,6) minimum clearance throughout glass envelope.

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|--------------|
| 2.5 | .220 | .200 | 500 | C-2R | L-8699 |
| 2.7 | .040 | .060 | 6,000 | C-2R | L-8704 |
| 3.0 | .003 | .015 | 10,000 | C-6 | L-390 |
| 5.0 | .030 | .060 | 60,000 | C-2R | L-7346 |
| 5.0 | .050 | .060 | 25,000 | C-2R | L-7347 |
| 5.0 | .150 | .060 | 5,000 | C-2R | L-3152 |
| 5.0 | .150 | .115 | 40,000 | C-2R | L-7348 |
| 6.0 | .030 | .040 | 10,000 | C-2V | L-8705 |
| 6.0 | .600 | .200 | 1,000 | C-2R | L-337 |
| 6.3 | .020 | .040 | 20,000 | C-2V | L-7351 |
| 6.3 | .230 | .075 | 1,000 | C-2R | L-8708 |
| 6.3 | .400 | .200 | 20,000 | C-2F | L-379 |
| 6.3 | .550 | .200 | 5,000 | C-2R | L-398 |
| 10.0 | .004 | .014 | 10,000 | C-2F | L-709 |
| 10.0 | .080 | .040 | 5,000 | C-2F | L-397 |
| 12.0 | .120 | .040 | 10,000 | C-2F | L-7354 |
| 14.0 | .300 | .080 | 40,000 | C-2F | L-386 |
| 14.0 | .500 | .080 | 1,500 | C-2F | L-336 |
| 14.0 | .500 | .100 | 10,000 | C-2F | L-393 |
| 18.0 | .150 | .040 | 10,000 | C-2F | L-346 |
| 28.0 | .150 | .024 | 4,000 | CC-2F | L-6035 |
| 28.0 | .150 | .040 | 10,000 | C-2F | L-7355 |
| 28.0 | .300 | .040 | 7,000 | C-2F | L-388 |
| 28.0 | .340 | .040 | 4,000 | C-2F | L-334 |

| Design Volts | Average MSCP | Design Amps | Life (hours) | Filament type | Lumitron P/N |
|--------------|--------------|-------------|--------------|---------------|----------------------|
| 5.0 | .340 | .200 | 15,000 | C-2R | L-341 ⁽¹⁾ |

⁽¹⁾ MS27569

Options and Finishes

Color coating (see inside back cover)
 add code letter to part number:

| Color | MIL spec | Code | Color | MIL spec | Code |
|------------|-------------|------|-----------|-------------|------|
| Blue-White | MIL-L-27160 | B | Red | MIL-L-25467 | R |
| Frosted | — | F | IPL White | MIL-C-25050 | W |
| Green | MIL-C-25050 | G | Yellow | MIL-C-25050 | Y |

Lens Ends: see inside back cover.

Silicon Booted: see inside back cover.

Special bases or leads: Call with your requirements.

Finishes

Midget Groove: Nickel plated brass shell with black phenolic insulation.

Drawing dimensions in inches (mm).

| Lumitron P/N | Page | Lumitron P/N | Page | Lumitron P/N | Page | Lumitron P/N | Page | Lumitron P/N | Page | Lumitron P/N | Page |
|--------------|------|--------------|------|--------------|------|--------------|------|--------------|------|--------------|------|
| L-2 | 2 | L-931 | 8 | L-3151 | 11 | L-7034 | 12 | L-7255 | 5 | L-7945 | 12 |
| L-2/S | 2 | L-932 | 8 | L-3151/BP | 12 | L-7100 | 2 | L-7255/BP10 | 6 | L-7968 | 12 |
| L-32 | 8 | L-933 | 8 | L-3152 | 14 | L-7101 | 2 | L-7257/BP10 | 6 | L-8022 | 8 |
| L-119 | 3 | L-1189 | 9 | L-3228 | 3 | L-7102 | 2 | L-7259 | 5 | L-8095 | 5 |
| L-119/BP10 | 6 | L-119/BP5 | 5 | L-3228/BP5 | 5 | L-7112 | 2 | L-7259/BP10 | 6 | L-8095/BP10 | 6 |
| L-119/EB5 | 7 | L-1190 | 9 | L-3228/BP10 | 6 | L-7113 | 2 | L-7260 | 5 | L-8097 | 5 |
| L-119/EB10 | 7 | L-1191 | 9 | L-3229 | 5 | L-7114 | 2 | L-7260/BP10 | 6 | L-8097/BP10 | 6 |
| L-323 | 10 | L-1406 | 9 | L-3229/BP10 | 6 | L-7115 | 2 | L-7261 | 5 | L-8098 | 5 |
| L-324 | 9 | L-1407 | 10 | L-3255 | 5 | L-7116 | 2 | L-7261/BP10 | 6 | L-8098/BP10 | 6 |
| L-327 | 13 | L-1408 | 9 | L-3255/BP10 | 6 | L-7117 | 2 | L-7263 | 5 | L-8099 | 5 |
| L-328 | 13 | L-1409 | 10 | L-3518 | 9 | L-7118 | 2 | L-7263/BP10 | 6 | L-8099/BP10 | 6 |
| L-330 | 13 | L-1410 | 9 | L-3581 | 10 | L-7119 | 2 | L-7265 | 5 | L-8099/BP10 | 6 |
| L-334 | 14 | L-1411 | 10 | L-3582 | 9 | L-7132 | 3 | L-7265/BP10 | 6 | L-8102 | 8 |
| L-336 | 14 | L-1412 | 9 | L-3584 | 10 | L-7132/BP5 | 5 | L-7266/BP10 | 6 | L-8111 | 3 |
| L-337 | 14 | L-1413 | 10 | L-3585 | 9 | L-7132/BP10 | 6 | L-7266/BP10 | 6 | L-8112 | 8 |
| L-338 | 13 | L-1428 | 11 | L-4003 | 9 | L-7132/EB5 | 7 | L-7267 | 5 | L-8175 | 3 |
| L-339 | 13 | L-1705 | 11 | L-4003/BP | 10 | L-7132/EB10 | 7 | L-7267/BP10 | 6 | L-8175/BP5 | 5 |
| L-341 | 14 | L-1705/BP | 12 | L-4003/BP | 10 | L-7132/IBP5 | 4 | L-7268 | 5 | L-8175/BP10 | 6 |
| L-344 | 13 | L-1730 | 11 | L-4004 | 9 | L-7132/IBP10 | 4 | L-7268/BP10 | 6 | L-8175/EB10 | 7 |
| L-345 | 13 | L-1738 | 11 | L-6022 | 3 | L-7133 | 2 | L-7270 | 5 | L-8425 | 11 |
| L-346 | 14 | L-1739 | 11 | L-6022/BP5 | 4 | L-7133/S | 2 | L-7270/BP10 | 6 | L-8515 | 9 |
| L-349 | 13 | L-1764 | 11 | L-6022/IBP10 | 4 | L-7152 | 3 | L-7271 | 5 | L-8537 | 2 |
| L-351 | 10 | L-1764/BP | 12 | L-6033 | 11 | L-7152/BP5 | 5 | L-7271/BP10 | 6 | L-8541 | 9 |
| L-361 | 11 | L-1783 | 11 | L-6035 | 14 | L-7152/BP10 | 6 | L-7272 | 5 | L-8543 | 10 |
| L-361/BP | 12 | L-1784 | 11 | L-6150 | 3 | L-7152/EB5 | 7 | L-7272/BP10 | 6 | L-8551 | 9 |
| L-365 | 13 | L-1784/BP | 12 | L-6150/BP5 | 4 | L-7152/EB10 | 7 | L-7274 | 5 | L-8553 | 10 |
| L-367 | 13 | L-1869 | 11 | L-6150/BP10 | 4 | L-7152/IBP5 | 4 | L-7274/BP10 | 6 | L-8608 | 9 |
| L-368 | 13 | L-2022 | 3 | L-6152 | 3 | L-7152/IBP10 | 4 | L-7309 | 10 | L-8608/BP | 10 |
| L-370 | 13 | L-2022/BP5 | 5 | L-6152/BP5 | 5 | L-7153 | 2 | L-7310 | 10 | L-8609 | 9 |
| L-375 | 13 | L-2022/BP10 | 6 | L-6152/BP10 | 6 | L-7153/S | 2 | L-7311 | 10 | L-8610 | 9 |
| L-379 | 14 | L-2022/EB5 | 7 | L-6152/EB5 | 7 | L-7200 | 3 | L-7327 | 12 | L-8610/BP | 10 |
| L-380 | 13 | L-2022/EB10 | 7 | L-6152/EB10 | 7 | L-7201 | 3 | L-7328 | 12 | L-8623 | 10 |
| L-381 | 13 | L-2022/IBP5 | 4 | L-6152/IBP5 | 4 | L-7202 | 3 | L-7330 | 12 | L-8627 | 9 |
| L-382 | 13 | L-2022/IBP10 | 4 | L-6152/IBP10 | 4 | L-7202/BP5 | 5 | L-7332 | 13 | L-8627/IBP | 10 |
| L-385 | 13 | L-2102 | 11 | L-6153 | 2 | L-7202/BP10 | 6 | L-7333 | 13 | L-8628 | 9 |
| L-386 | 14 | L-2102/BP | 12 | L-6153/S | 2 | L-7203 | 3 | L-7335 | 13 | L-8632 | 9 |
| L-387 | 13 | L-2107 | 11 | L-6180 | 8 | L-7204 | 3 | L-7339 | 12 | L-8637 | 9 |
| L-388 | 14 | L-2107/BP | 12 | L-6212 | 3 | L-7204/BP5 | 5 | L-7344 | 12 | L-8639 | 10 |
| L-390 | 14 | L-2112 | 11 | L-6212/BP5 | 5 | L-7204/BP10 | 6 | L-7346 | 14 | L-8640 | 9 |
| L-393 | 14 | L-2112/BP | 12 | L-6212/BP10 | 6 | L-7205 | 3 | L-7347 | 14 | L-8640/BP | 10 |
| L-394 | 13 | L-2114 | 9 | L-6212/EB5 | 7 | L-7206 | 3 | L-7348 | 14 | L-8646 | 9 |
| L-397 | 14 | L-2114/BP | 10 | L-6212/EB10 | 7 | L-7206/BP5 | 5 | L-7349 | 12 | L-8654 | 10 |
| L-398 | 14 | L-2128 | 3 | L-6802 | 3 | L-7206/BP10 | 6 | L-7351 | 14 | L-8666 | 2 |
| L-419 | 2 | L-2158 | 11 | L-6802/BP5 | 5 | L-7207 | 3 | L-7354 | 14 | L-8668 | 13 |
| L-481 | 3 | L-2162 | 11 | L-6802/BP10 | 6 | L-7208 | 3 | L-7355 | 14 | L-8672 | 9 |
| L-481/BP5 | 5 | L-2162/BP | 12 | L-6802/EB5 | 7 | L-7209 | 3 | L-7360 | 12 | L-8672/BP | 10 |
| L-481/BP10 | 6 | L-2174 | 11 | L-6802/EB10 | 7 | L-7209/BP5 | 5 | L-7361 | 12 | L-8673 | 9 |
| L-481/EB5 | 7 | L-2180 | 11 | L-6802/IBP5 | 4 | L-7209/BP10 | 6 | L-7362 | 12 | L-8675 | 10 |
| L-481/EB10 | 7 | L-2181 | 11 | L-6802/IBP10 | 4 | L-7210 | 3 | L-7367 | 12 | L-8676 | 9 |
| L-515 | 9 | L-2181/BP | 12 | L-6803 | 2 | L-7211 | 3 | L-7370 | 12 | L-8676/BP | 10 |
| L-515/BP | 10 | L-2182 | 11 | L-6803/S | 2 | L-7212 | 3 | L-7371 | 12 | L-8677 | 9 |
| L-580 | 9 | L-2182/BP | 12 | L-6806 | 3 | L-7212/BP5 | 5 | L-7373 | 12 | L-8678 | 10 |
| L-580/BP | 10 | L-2185 | 11 | L-6807 | 3 | L-7212/BP10 | 6 | L-7375 | 12 | L-8680 | 9 |
| L-583 | 9 | L-2185/BP | 12 | L-6808 | 3 | L-7212/EB5 | 7 | L-7380 | 12 | L-8680/BP | 10 |
| L-583/BP | 10 | L-2187 | 11 | L-6809 | 3 | L-7212/EB10 | 7 | L-7381 | 12 | L-8681 | 9 |
| L-634 | 9 | L-2187/BP | 12 | L-6832 | 3 | L-7213 | 3 | L-7382 | 12 | L-8683 | 10 |
| L-634/BP | 10 | L-2200 | 11 | L-6832/BP5 | 5 | L-7214 | 3 | L-7387 | 12 | L-8699 | 14 |
| L-679 | 8 | L-2200/BP | 12 | L-6832/BP10 | 6 | L-7215 | 3 | L-7474 | 12 | L-8704 | 14 |
| L-680 | 3 | L-2203 | 11 | L-6832/EB5 | 7 | L-7216 | 3 | L-7515 | 10 | L-8705 | 14 |
| L-680/BP5 | 4 | L-2203/BP | 12 | L-6832/EB10 | 7 | L-7218 | 3 | L-7538 | 2 | L-8708 | 14 |
| L-680/BP10 | 4 | L-2400 | 2 | L-6832/IBP5 | 4 | L-7219 | 3 | L-7580 | 10 | L-8711 | 3 |
| L-682 | 8 | L-2400/BP | 2 | L-6832/IBP10 | 4 | L-7220 | 3 | L-7583 | 10 | L-8757 | 5 |
| L-683 | 3 | L-2404 | 2 | L-6833 | 2 | L-7225 | 8 | L-7628 | 10 | L-8757 | 5 |
| L-683/BP5 | 4 | L-2404/BP | 2 | L-6833/S | 2 | L-7226 | 8 | L-7632 | 10 | L-8805 | 11 |
| L-683/BP10 | 4 | L-3023 | 3 | L-6838 | 3 | L-7227 | 8 | L-7637 | 10 | L-8805/BP | 12 |
| L-685 | 8 | L-3023/BP5 | 5 | L-6838/IBP5 | 4 | L-7228 | 8 | L-7646 | 10 | L-8918 | 13 |
| L-709 | 14 | L-3023/BP10 | 6 | L-6838/IBP10 | 4 | L-7229 | 8 | L-7680 | 5 | L-9256 | 8 |
| L-713 | 3 | L-3024 | 8 | L-6839 | 8 | L-7230 | 8 | L-7680/BP10 | 6 | | |
| L-713/BP5 | 4 | L-3037 | 3 | L-7008 | 3 | L-7231 | 8 | L-7683 | 5 | | |
| L-713/BP10 | 4 | L-3037/BP5 | 5 | L-7008/BP5 | 5 | L-7232 | 8 | L-7683/BP10 | 6 | | |
| L-714 | 8 | L-3037/BP10 | 6 | L-7008/BP10 | 6 | L-7233 | 8 | L-7708 | 12 | | |
| L-715 | 3 | L-3038 | 8 | L-7008/EB5 | 7 | L-7234 | 8 | L-7714 | 5 | | |
| L-715/BP5 | 4 | L-3043 | 3 | L-7008/EB10 | 7 | L-7235 | 8 | L-7714/BP10 | 6 | | |
| L-715/BP10 | 4 | L-3043/BP5 | 5 | L-7009 | 3 | L-7236 | 8 | L-7715 | 5 | | |
| L-716 | 3 | L-3043/BP10 | 6 | L-7009/BP5 | 5 | L-7237 | 8 | L-7715/BP10 | 6 | | |
| L-718 | 8 | L-3044 | 8 | L-7009/BP10 | 6 | L-7238 | 8 | L-7716 | 5 | | |
| L-901 | 2 | L-3091 | 3 | L-7009/EB5 | 7 | L-7239 | 8 | L-7716/BP10 | 6 | | |
| L-919 | 5 | L-3091/BP5 | 5 | L-7009/EB10 | 7 | L-7240 | 8 | L-7810 | 2 | | |
| L-919/BP10 | 6 | L-3091/BP10 | 6 | L-7009/IBP5 | 4 | L-7241 | 8 | L-7811 | 2 | | |
| L-922 | 5 | L-3092 | 8 | L-7009/IBP10 | 4 | L-7248 | 8 | L-7838 | 12 | | |
| L-922/BP10 | 6 | L-3149 | 12 | L-7022 | 5 | L-7254 | 5 | L-7839 | 5 | | |
| L-930 | 8 | L-3150 | 13 | L-7022/BP10 | 6 | L-7254/BP10 | 6 | L-7839/BP10 | 6 | | |

Maximizing Lamp Life

The three operating factors that most contribute to shortened lamp life are:

- Overheating—lamp envelope temperature should not exceed 100 degrees C.
- Power fluctuations.
- Mechanical shock and vibration, particularly when the lamp is on.

Shock and vibration considerations:

Lumitron lamps are designed for exceptionally long life, a high degree of reliability, and low replacement rate. Because of this, they are used in many critical applications where replacement is difficult or impossible. In addition to long life expectancy, Lumitron low-voltage incandescent lamps have withstood the deteriorating effects of random vibration and shock in the most exacting military and commercial applications. For example, our L-715-AS15, which operates at 5 volts and draws 115 milliamperes of current, has a relatively short filament and can withstand considerable shock and vibration. However, lamps which operate at voltages in excess of 6 volts and draw proportionally less current, require longer filaments. These longer filaments usually require internal support wires (see inside front cover for illustration), and are more susceptible to shock and vibration than lower-voltage lamps with short filaments.

Keep-alive current: Because the resistance of tungsten filaments is far greater when the filament is cold, supplying a small current—as little as one percent of operating voltage—to the lamp when switched off will keep the filament warm and buffer it against inrush current when switched on. This greatly extends the life of the lamp.

Re-rating: When long life is a primary requirement in your design, re-rating a standard lamp (see information at right) can greatly increase lamp life.

Lamp Re-rating

Re-rating a standard lamp—adjusting the voltage above or below the stated design figure—can often produce the desired relationship of current, life, and brightness in a specific application, avoiding the expense of a custom design. Changing the voltage affects other characteristics according to the formulas and charts below.

Re-rating formulas: Three basic formulas apply when re-rating lamps. In these formulas, V_A indicates Application Voltage, and V_D indicates Design Voltage.

| | | |
|---|--|---|
| Re-rated MSCP $\left(\frac{V_A}{V_D}\right)^{3.5} \times \text{MSCP at } V_D$ | Re-rated Life $\left(\frac{V_D}{V_A}\right)^{12} \times \text{Life at } V_D$ | Re-rated Current $\left(\frac{V_A}{V_D}\right)^{.55} \times \text{Current at } V_D$ |
|---|--|---|

MSCP is directly proportional to the 3.5 power of the ratio of the applied voltage versus the design voltage, and can be increased at the expense of lamp life.

Current consumption is approximately proportional to the 0.55 power of the ratio of applied voltage versus the rated voltage.

The interrelationship of voltage, current, MSCP, and life for a particular lamp can be found on the charts below. Simply multiply the rated figures by the factors to find the effects of re-rating at specific percentages of design voltage.

Example: Lumitron P/N L-715-AS15 is a 5-volt lamp with .150 MSCP, 115mA current draw, and 40,000 hour life. Operating the lamp at 6 volts, or 120 percent of design volts, yields the following characteristics:

MSCP: Multiplying the 5-volt MSCP figure of .150 by 1.893 (from the chart) yields an MSCP of .284 when the lamp is operated at 6 volts.

mA: Multiplying the 5-volt mA figure of .115 by 1.105 (from the chart) yields a current draw of .127 mA when the lamp is operated at 6 volts.

Life: Multiplying the 5-volt life figure of 40,000 hours by .112 (from the chart) yields a life expectancy of 4,480 hours when the lamp is operated at 6 volts.

| Underrated Lamp Voltages | | | |
|--------------------------|-------------|-------------|-------------|
| Percent of design volts | Amps factor | MSCP factor | Life factor |
| 99 | .995 | .965 | 1.13 |
| 98 | .989 | .932 | 1.28 |
| 97 | .983 | .899 | 1.44 |
| 96 | .978 | .867 | 1.63 |
| 95 | .982 | .836 | 1.85 |
| 90 | .944 | .692 | 3.55 |
| 85 | .914 | .566 | 7.03 |
| 80 | .885 | .458 | 14.55 |
| 75 | .854 | .365 | 31.57 |
| 70 | .822 | .287 | 72.22 |

| Overrated Lamp Voltages | | | |
|-------------------------|-------------|-------------|-------------|
| Percent of design volts | Amps factor | MSCP factor | Life factor |
| 101 | 1.006 | 1.035 | .885 |
| 102 | 1.011 | 1.072 | .788 |
| 103 | 1.016 | 1.109 | .701 |
| 104 | 1.022 | 1.147 | .625 |
| 105 | 1.027 | 1.186 | .557 |
| 110 | 1.054 | 1.396 | .319 |
| 115 | 1.080 | 1.636 | .187 |
| 120 | 1.105 | 1.893 | .112 |
| 125 | 1.130 | 2.184 | .069 |
| 130 | 1.155 | 2.504 | .043 |

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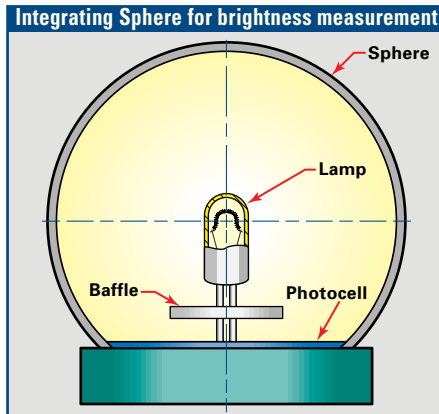
Brightness Measurement

Mean Spherical Candlepower (MSCP) of a lamp is derived by centering the lamp within an integrating sphere with a typical interior diameter of one foot (30,5 cm). The interior of the sphere has a bright white, matte coating that disperses and reflects the light evenly.

A photocell in the base of the sphere converts the light energy to electrical current, and sends the current to specialized instrumentation for measurement.

A baffle shields the photocell from direct illumination by the lamp, ensuring measurement of a true average of light produced by the lamp.

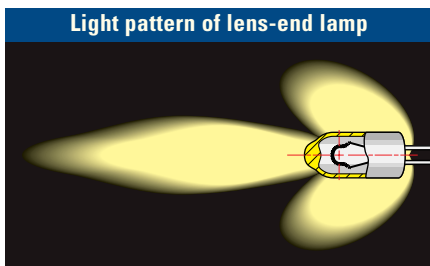
To convert MSCP to lumens, multiply by 12.57 (4 π).



Options

Aged & Selected (AS) Lamps: Lumitron Aged & Selected (AS) lamps are aged for a minimum of 16 hours and selected for MSCP tolerance prior to shipment. A lamp designated AS15 is aged for 16 hours at rated voltage, and selected to have an MSCP tolerance of +/- 15%. Extended aging is available when greater stability in light output is desired. Other options for MSCP selection are available, such as AS10, AS5, and +15%, -0%.

Lens End Lamps: A lens formed in the end of the lamp envelope significantly increases the amount and intensity of light projected from the front of the lamp. Lens end lamps add approximately .060" (1,5 mm) to the lamp length.



Helium-Retardant Lamps: Pioneered by Lumitron, these lamp types feature thick-wall glass envelopes to retard outgassing and increase lamp life when used in helium-atmosphere instrumentation.

MIL-Spec Lamps: We can supply lamps to a wide variety of MIL specifications, including Aged & Selected types.

Custom Designs: If one of our standard lamps does not fit your needs, we can provide a custom filament, glass, or base design for your application.

Color Options

Lumitron offers both coated lamps and silicone booted lamps in Mil-Spec, commercial or custom colors. Our in-house design capability can match existing colors, or conform to X-Y chromaticity requirements to meet specific design specifications. Frosted lamps are also available for diffused lighting.

Color Coating: Our coated lamps have a "glass hard" epoxy coating that allows maximum transmission of light while minimizing color shift during the life of the lamp. Lumitron color coated lamps are highly resistant to salt spray, ozone, scratches, Freon and other solvents and can operate in a temperature range of -55° C to +85° C.

Silicone Boots: Silicone boot lamp filters are available as lamp assemblies or can be purchased separately. They are resistant to salt spray, sunlight, ozone, and most acids and can operate in a wide temperature range. Booted lamp assemblies are potted with silicone material appropriate to the color of the silicone boot to eliminate unfiltered light leakage.

Blue-White color coated or booted lamps are filtered for illuminating systems for integrally white-lighted aircraft instruments as called out in MIL-L-27160.

Red color coated or booted lamps are filtered to conform to Aviation Red as specified in MIL-C-25050 and MIL-L-25467. The minimum color emitted is no paler or more yellow than the N.I.S.T. No. 3215 filter. For diffused red use the color code DR after the Lumitron part number (P/N).

Aviation Colors: Yellow, green, and IPL white color coated or booted lamps are filtered to the specifications called out in MIL-C-25050.

Ordering Information: Color coated lamps can be ordered by using the Lumitron P/N and then adding the code letter for the color.

Example: If an MS27571-6809-AS15 is required coated per MIL-L-27160, then the Lumitron part number (L-6809-AS15) plus the code letter (**B**) would be P/N L-6809-AS15-B.

For silicone booted lamp assembly add **-SB** after the color code. For example, L-715-AS15-R-SB is a MS24367-715-AS15 lamp with a red boot. For ordering boots separately, please call us.

| Color Codes | | |
|-------------|-------------|----------|
| Color | MIL spec | Code |
| Blue-White | MIL-L-27160 | B |
| Frosted | — | F |
| Green | MIL-C-25050 | G |
| Red | MIL-L-25467 | R |
| IPL White | MIL-C-25050 | W |
| Yellow | MIL-C-25050 | Y |

Other options and combinations: Due to space considerations, not all Lumitron part numbers are included in this catalog. Variations of standard parts are readily available, and we can cross-reference from most competitor part numbers. Please contact us with your specific requirements.

Continued on back cover

C.I.E. Diagram Information

The C.I.E. Chromaticity Diagram is a plot of X versus Y for all visible colors.

The *Commission Internationale de l'Éclairage* (C.I.E.) XYZ model defines three primaries mingled in an additive manner called X, Y and Z that can be combined to match any color humans see. This relates to the tristimulus theory of color perception, which states that the human retina has 3 kinds of cones with peak sensitivities to 580 nm (“red”), 545 nm (“green”) and 440 nm (“blue”).

The Y primary was defined to match the luminous efficiency function of the human eye. X and Z were obtained based on experiments involving human observers. The chromaticity values are defined as:

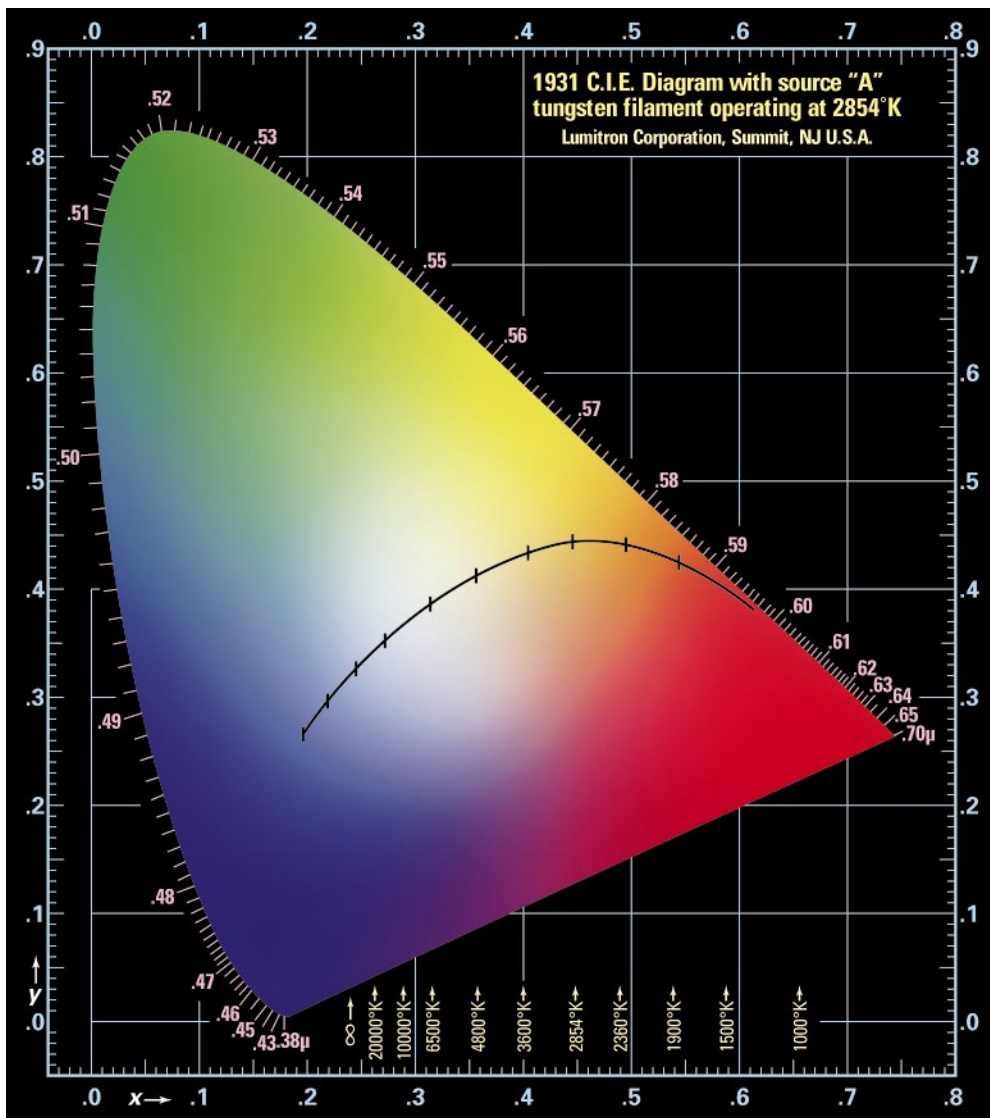
$$x = X / (X+Y+Z)$$

$$y = Y / (X+Y+Z)$$

$$z = Z / (X+Y+Z)$$

Knowing x and y, z can be found as $z = 1 - x - y$.

Each point on the edge of the C.I.E. Chromaticity Diagram denotes a pure color of a specific wavelength. White is at the center where all colors combine equally ($x = y = z = 1/3$).



Reference materials for preparation of this chart provided by Hoffman Engineering, Stamford, CT