Sōlarc® LIGHT

# SINGLE-ENDED LAMP

## The Short Arc Gap

USHIO's Sōlarc® single-ended lamps allow the equipment designer to capitalize on the lamp's unique short arc length. At 1.27mm, with a peak luminance at the cathode, the lamp begins to approximate a point source. Coupled with carefully designed lenses or reflectors with maximum light capture and the appropriate focus, the lamp can deliver high-intensity light to tightly controlled or divergent beam applications. The figure below shows the luminous intensity distribution of the arc. The two sources of peak intensity lie near the electrode tips.

## Highest Efficacy

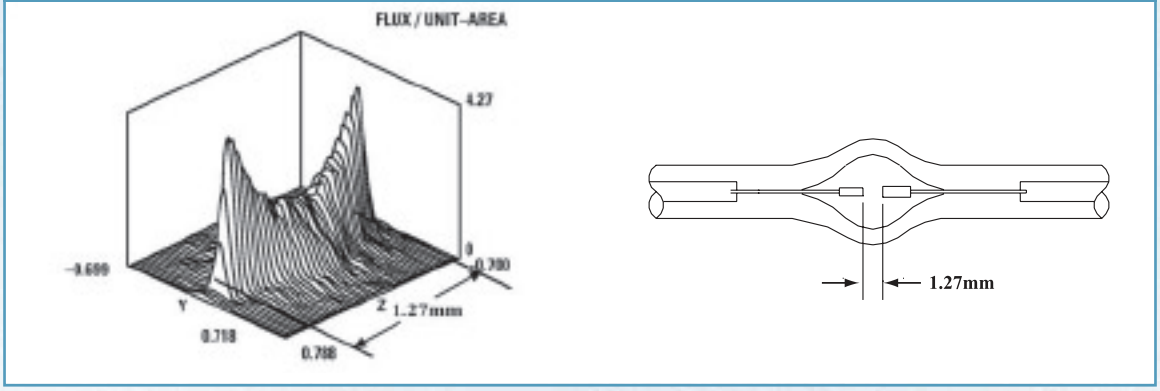
Metal halide lamps are inherently very efficient, providing two to three times the efficacy of either halogen or xenon lamps. Optimizing the optical system using the short arc can provide an efficiency increase in many applications, allowing the Sōlarc lamp to deliver as much light as a halogen lamp with four to five times more wattage. High efficacy plus the resultant decreased demand for power allow the equipment designer to develop miniature, lighter weight, portable and even battery-powered product configurations.

## White Light

Sōlarc lamps produce a color temperature in the range of 5,000K–7,000K, putting it in the same range as the sun. For comparison, halogen lamps normally operate in the 3,000K–3,200K range and incandescent lamps in the 2,800K-2,900K range. In visible terms, the lower color temperature dictates more red or yellow in the light.

The higher color temperature enables realistic visualization of color. While it is possible to operate halogen lamps up to 4,300K by the use of filters, it is only at a severe reduction in lamp life and output. The 5,000K–7,000K color temperature of Sōlarc produces a whiter "cooler" light which reproduces the full range of colors. The output is color balanced, making it ideal for use with CCD video cameras. Sōlarc lamps also deliver less heat to the object.

### Luminous Intensity/Arc Cross Section




USHIO

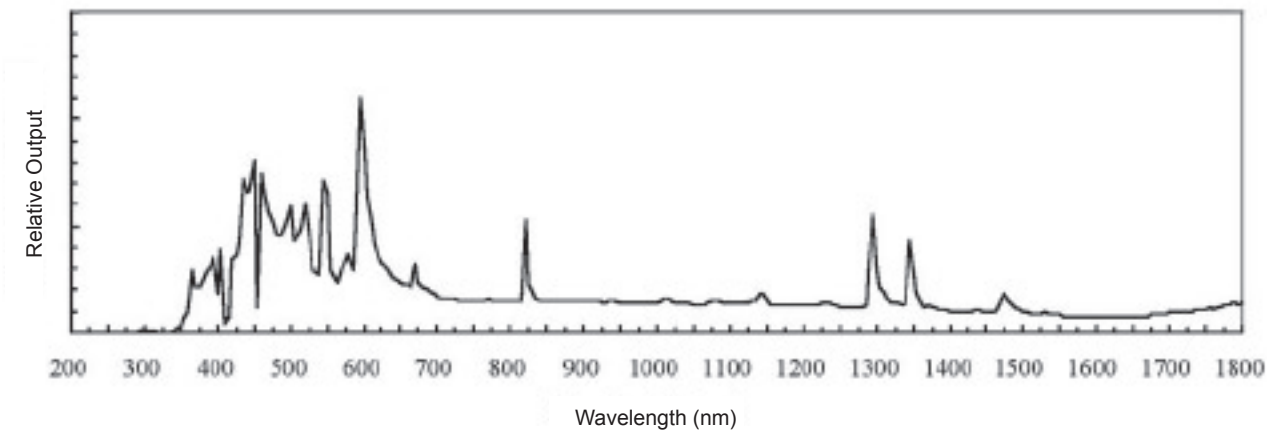
## Excellent Light Maintenance

Unlike many metal halide lamps, Sōlarc® lamps maintain their intensity and color balance throughout their life. In applications requiring white light, the life of the Sōlarc lamp could be many times that of a competing halogen lamp. Typically a lamp will maintain over 80% of its initial intensity. Shifts in X and Y chromaticity values are typically less than 1.5%. Lamp life is specified as a median life. Median life defines the number of hours, at a given duty cycle, that half of the lamps will continue to operate. Life is also dependent on the duty cycle of the lamp. Sōlarc lamp life is specified on the basis of a duty cycle of one hour on for each start. A duty cycle with a longer "on" time for each start will extend the life, and shorter "on" times will reduce lamp life.

## The Spectrum

A typical spectral distribution of the lamp is indicated below. In general, the distribution is optimized for the visible range, but it is possible to develop systems with varying spectral content. Lamps can be manufactured which are uniquely rich in the mid- and far-infrared.

**Typical Spectral Output—21W Lamp**



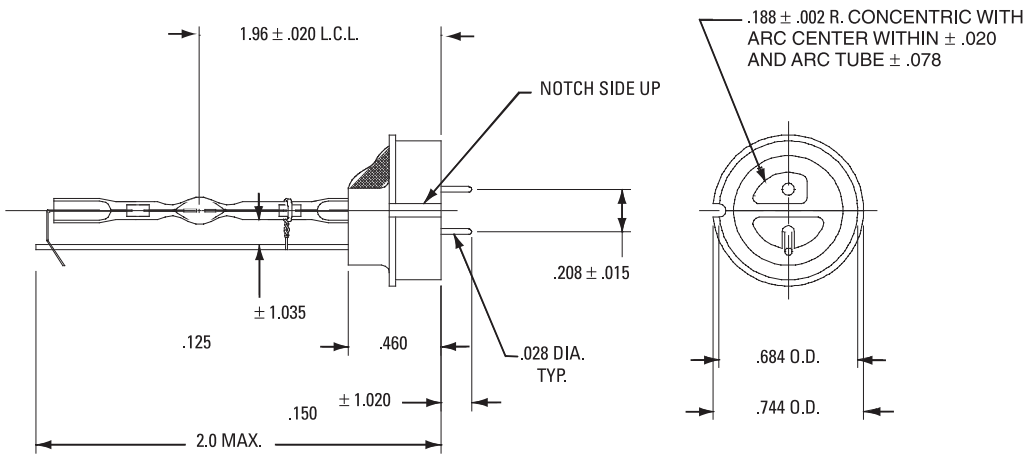

## Additional Cooling

Sōlarc lamps operate at relatively high temperatures and require adequate cooling. The reflectorized lamps are designed to let the heat pass through the reflector, simplifying the mechanical/thermal design. USHIO America offers a test lamp with embedded thermocouples to evaluate the cooling design of your application.

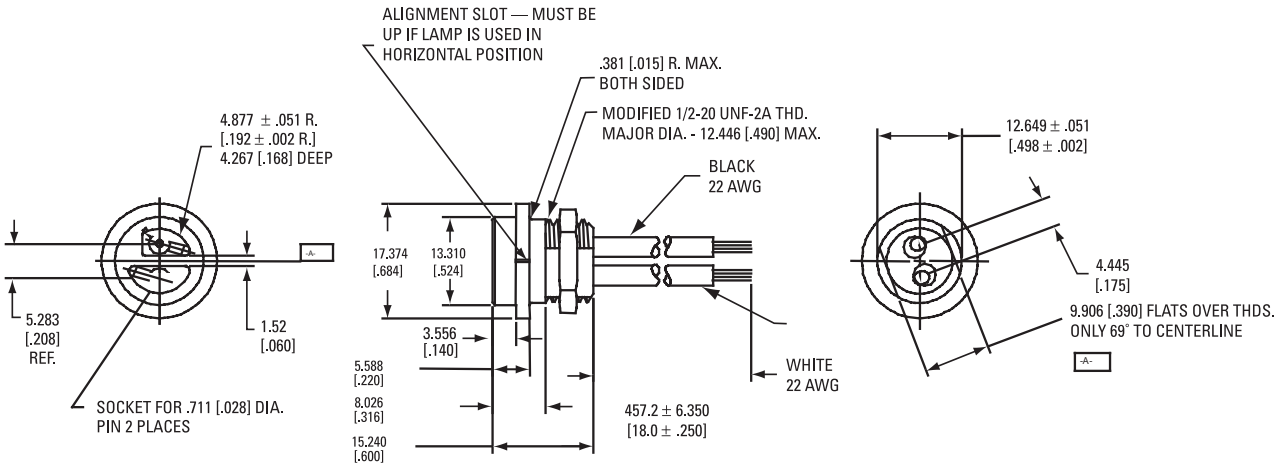
## Accessories

Sōlarc lamps require a ballast to ignite and sustain operation. The ballast model numbers listed in the table on page 4 are specifically designed to operate USHIO America patented arc lamp technology. A special connector, C18A004, is required to connect the lamp and ballast. This connector assembly includes a polarized mating connector with 45.7cm (18 inch) of silicone-jacketed wire rated for high-voltage pulses with tinned leads for solder connection to the ballast.

## M21N002 Sōlarc® SEL Assembly—All measurements in inches



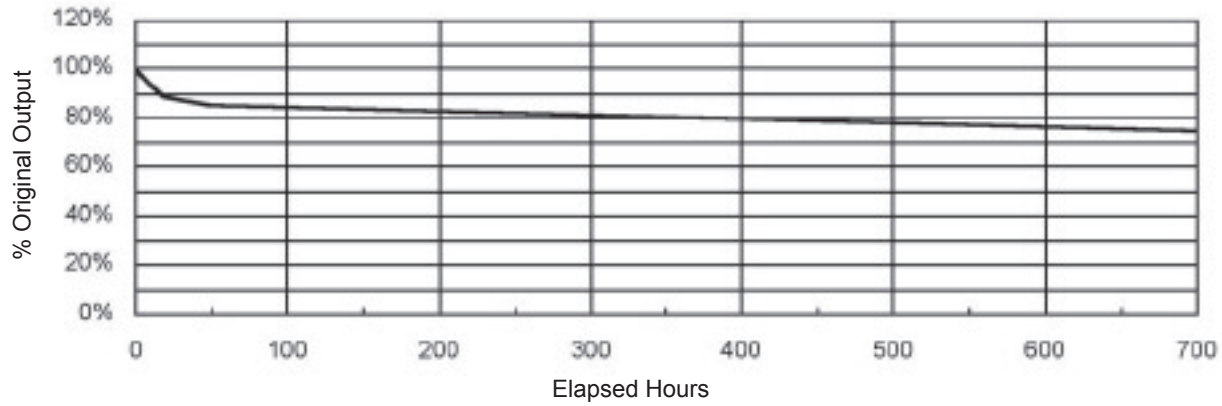

## C18A004 Connector Assembly—All measurements in mm [inches]



| M21N002 Sōlarc® SEL Performance Specifications | | | |
|---|---|---|---|
| Wattage | 19 Watts | 22 Watts | 25 Watts |
| Initial Lumens | 1,150 | 1,500 | 1,850 |
| Correlated Color Temperature | 6,250K | 5,830K | 5,460K |
| Chromaticity (x, y) | 0.32, 0.31 | 0.33, 0.32 | 0.33, 0.34 |
| Median Lamp Life [1] | 1,100 | 750 | 350 |
| Lamp Maintenance and Spectrum | Refer to data below and on page 2 | | |
| Warm-up Time to 90% Output | 20 Seconds | | |
| Restart Time to 90% Output | 30 Seconds | | |
| Ballast Requirements | | | |
| Regulated Ballast P/N | B19R001 | B22R001 | B25R001 |
| Input Voltage (VDC) | 9.8–15.0 | | |
| Steady-State Current (Amps) | 2.0 | 2.3 | 2.6 |

[1] Median Lamp Life: 1 hour on / 15 minutes off duty cycle.

## Typical Light Maintenance—21W Lamp




## Operating Characteristics

**Start/Restart:** Igniting the lamp requires short, high voltage pulses provided by the USHIO America ballast. In less than 20 seconds, the 21W lamp will reach 90% of its light output. Color temperature will vary during start-up condition.

## Orientation and Cooling

The lamp data above was characterized in the recommended horizontal operating position. The lamp may be operated in other mounting orientations but performance may vary significantly. To maximize lamp life, the anode and cathode seal areas must be maintained at 200°C to 285°C and 100°C to 150°C, respectively.