

### KEY FEATURES

- Steady State (DC) Emitters
- Emulates a Black-Body in Spectral Distribution
- Coiled Filament with Specialized Coating
- Reflector Provides Collimated and Uniform Radiation
- Typical Emissivity 0.70

### Filament Temperature vs Input Power

Opto Diode SA Series infrared (IR) emitters are designed to be used as steady state (DC) emitters of black-body radiation. The radiating element in the steady-state emitters is a coiled filament of specific material with a specialized coating with typical emissivity of 0.70. Radiated output closely emulates a black-body in spectral distribution. SA Series emitters are designed to operate at a rated filament temperature of 1170 K. Standard SA-series emitters are offered in several models with specific filament diameters and number of coils to provide the desired input/output power at a filament temperature of 1170 K.

Standard window materials are available to tailor the output to specific wavelength ranges of interest. Standard models include a parabolic reflector to provide near collimated and uniform radiation output.

### Drive Circuit

Any constant voltage or constant current DC power supply with appropriate rating.

### Filament Temperature vs. Input Power

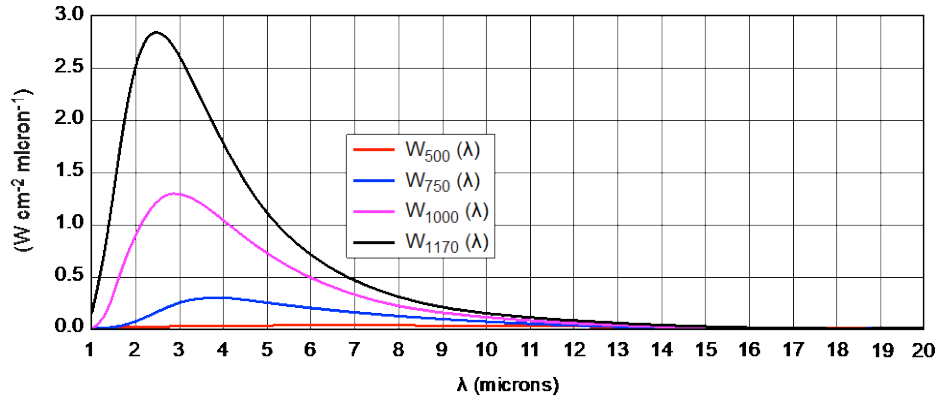
Steady State emitters are designed to operate with a filament temperature of approximately 1170 K (900°C) at the rated input power. Exceeding this value will raise the element temperature and decrease emitter lifetime. Since the radiated energy is proportional to the fourth power of the absolute temperature ( $T^4$ ), accurate control of the input power and proper heat sinking of the package are essential to maintain constant element temperature and output. The heat sink must limit the package temperature to not more than 100°C. The relationship between peak wavelength ( $\lambda_{pk}$  in microns) and temperature ( $T$  in K) for the black-body spectrum is expressed by Wien's law as:

$$\lambda_{pk} (\text{microns}) \times T (K) = 2898$$

Thus, the wavelength for maximum output varies inversely with the absolute temperature. At a temperature of 1170 K, this maximum is at 2.5 microns. SA Series steady state emitters are quasi-black-body with an emissivity of 0.7. The emissivity is the ratio of the energy radiated by the source to that which would be radiated by a true black-body at the same temperature.

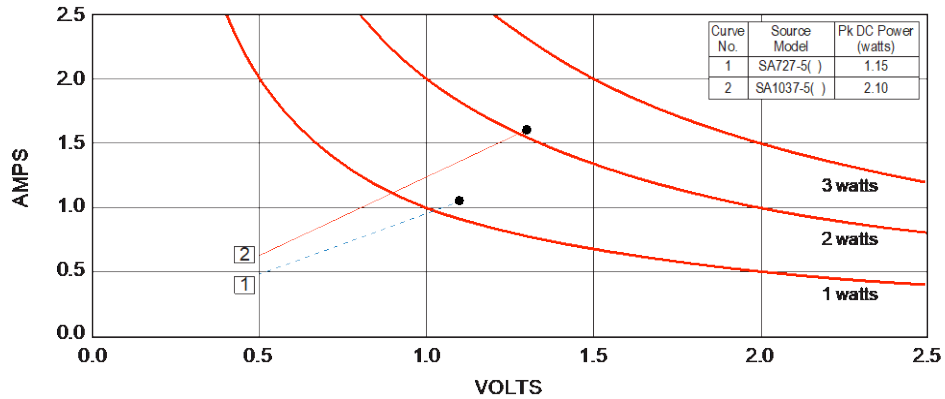
**Black-body Radiant Emittance**

SA Series emitters approximate black-body sources at their particular operating temperature. Below is a reference graph showing ideal black-body curves at various temperatures, in K.



**DC Power Curves (I vs. V) SA-Series TO5**

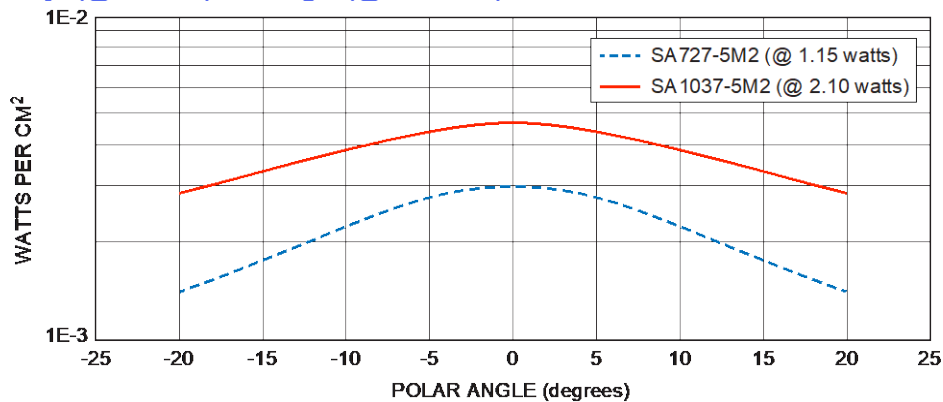
**DC Power Curve<sup>1</sup>**



<sup>1</sup> 1170 K at power indicated (\*). Exceeding this value will raise element temperature and decrease source lifetime.

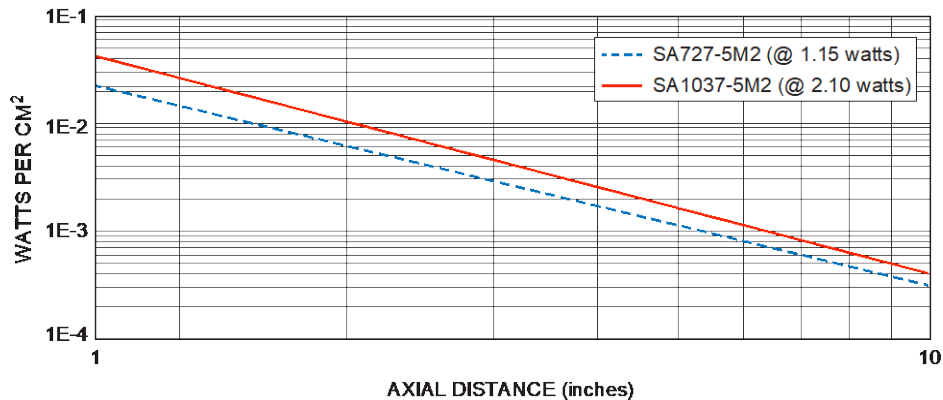
**Polar and Axial Intensity Distribution SA-Series TO5**

**Average DC Intensity<sup>2</sup> (@ 1170 K) vs. Angle (@ 3 inches)**



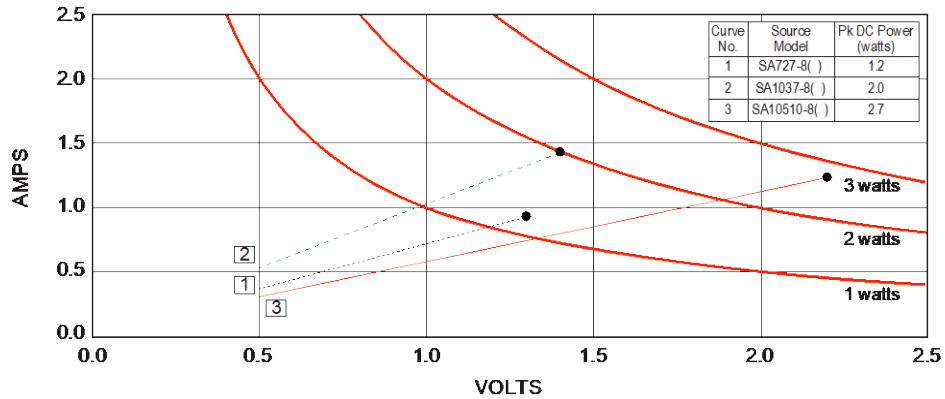
<sup>2</sup> Average of values parallel and perpendicular to axis of element.

**DC Intensity<sup>2</sup> (@ 1170 K) vs. Distance**



**DC Power Curves (I vs. V) SA-Series TO8**

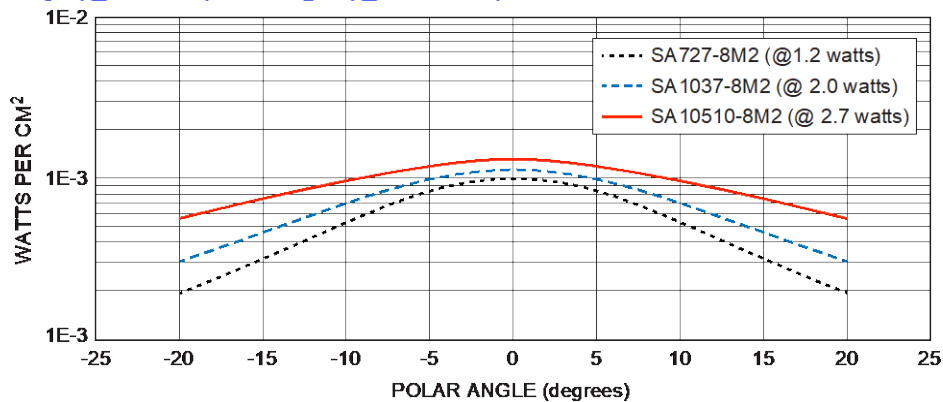
**DC Power Curve<sup>3</sup>**



<sup>3</sup> 1170 K at power indicated (\*). Exceeding this value will raise element temperature and decrease source lifetime.

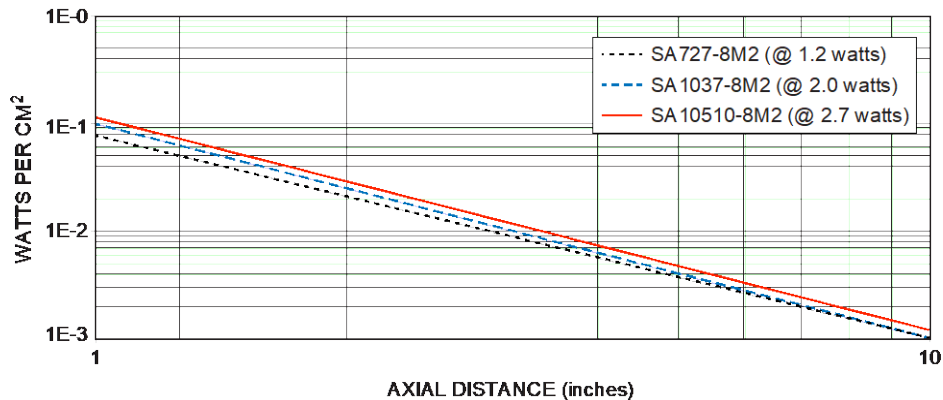
**Polar and Axial Intensity Distribution SA Series TO8**

**Average DC Intensity<sup>4</sup> (@ 1170 K) vs. Angle (@ 3 inches)**

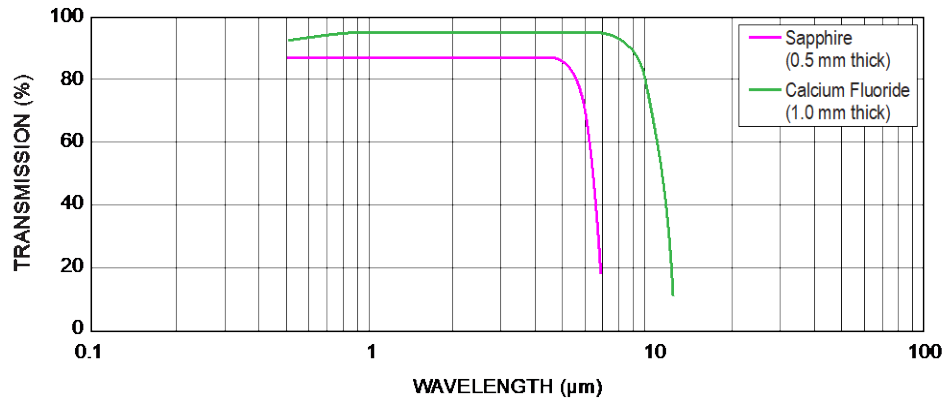


<sup>4</sup> Average of values parallel and perpendicular to axis of element.

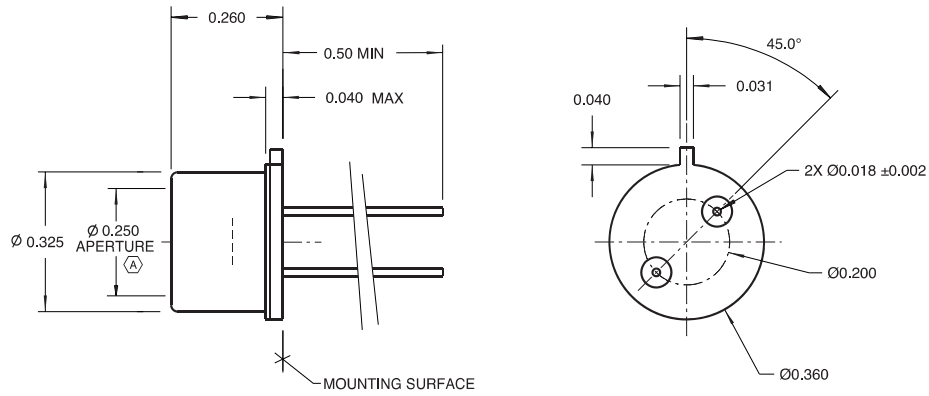
**DC Intensity (@ 1170 K) vs. Distance**



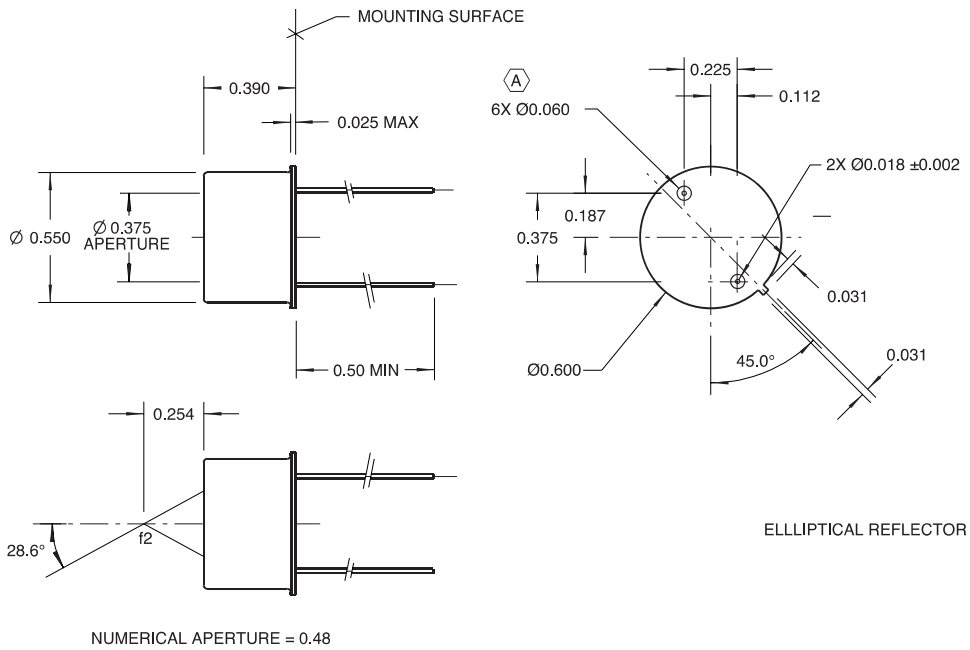
## Window Spectral Transmission Options



**TO-5 Package**



**TO-8 Package**



### Ordering Information

SA-XXXXX-YYY

SA – S Source, A Steady State

XXXXX – Filament and Foil Dimensions

YYY – Packaging and Window Options

**SA727-5M2 (40095)** Steady State Emitter 727 in TO5 Package with Sapphire Window

**SA727-8M2 (40198)** Steady State Emitter 727 in TO8 Package with Sapphire Window

**SA1037-5M2 (40089)** Steady State Emitter 1037 in TO5 Package with Sapphire Window

**SA10510-8M2 (40092)** Steady State Emitter 10510 in TO8 Package with Sapphire Window

**SA727-5M3 (40096)** Steady State Emitter 727 in TO5 Package with Calcium Fluoride Window

**SA1037-5M3 (40090)** Steady State Emitter 1037 in TO5 Package with Calcium Fluoride Window

**SA10510-8M3 (40093)** Steady State Emitter 10510 in TO8 Package with Calcium Fluoride Window

Specifications are subject to change without prior notice.