

## Infrared Emitters - SHA Series

---

### Key Features

- High Power 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



### HIGH POWER STEADY-STATE EMITTERS - SHA SERIES

Opto Diode High Power SHA-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. SHA-series emitters are designed to operate at a rated filament temperature of 1170° Kelvin.

SHA-Series emitters are offered in TO-5 packages with specific filament diameters and number of coils to provide the desired input/output power at a filament temperature of 1170°K. The emitters include a parabolic reflector to provide near collimated and uniform radiation output. These packages come with or without windowing options.

#### Drive Circuit

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

### Filament Temperature vs. Input Power

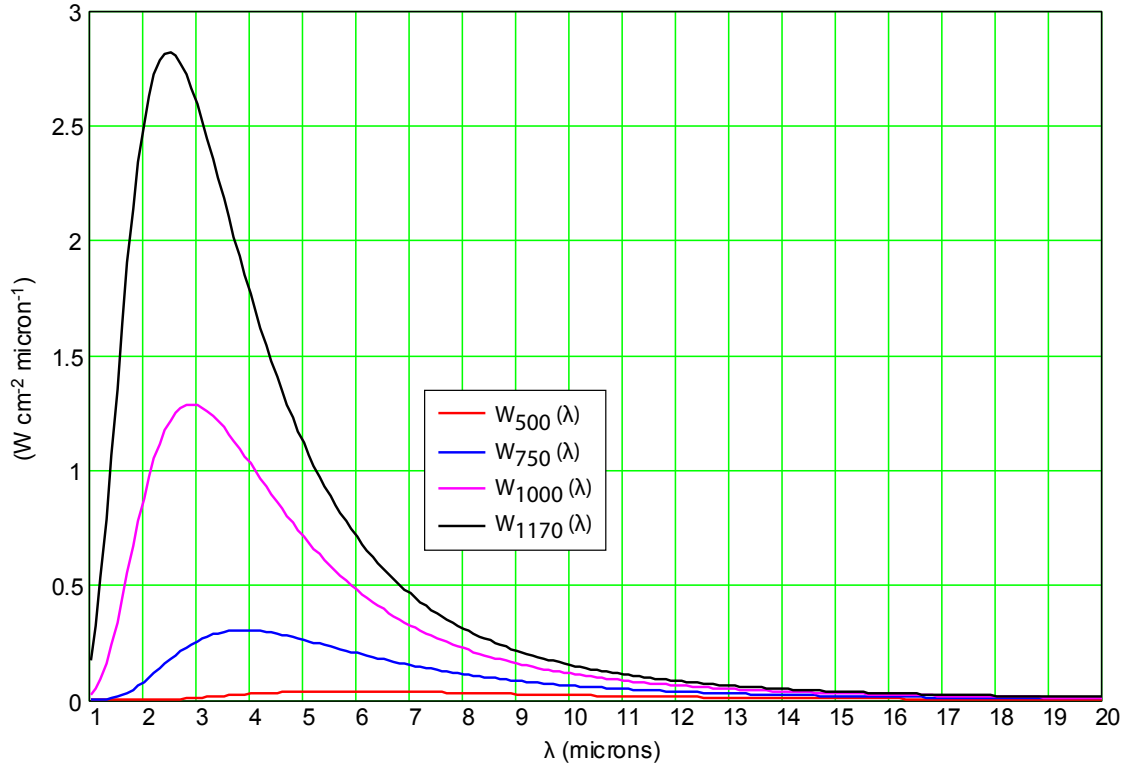
Steady State emitters are designed to operate with a filament temperature of approximately 1170°K (900°C) at the rated input power. Exceeding this value will raise the element temperature and decrease emitter lifetime. Since the radiated energy is proportional to the fourth power of the absolute temperature ( $T^4$ ), 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°Kelvin) for the black-body spectrum is expressed by Wien's law as:

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

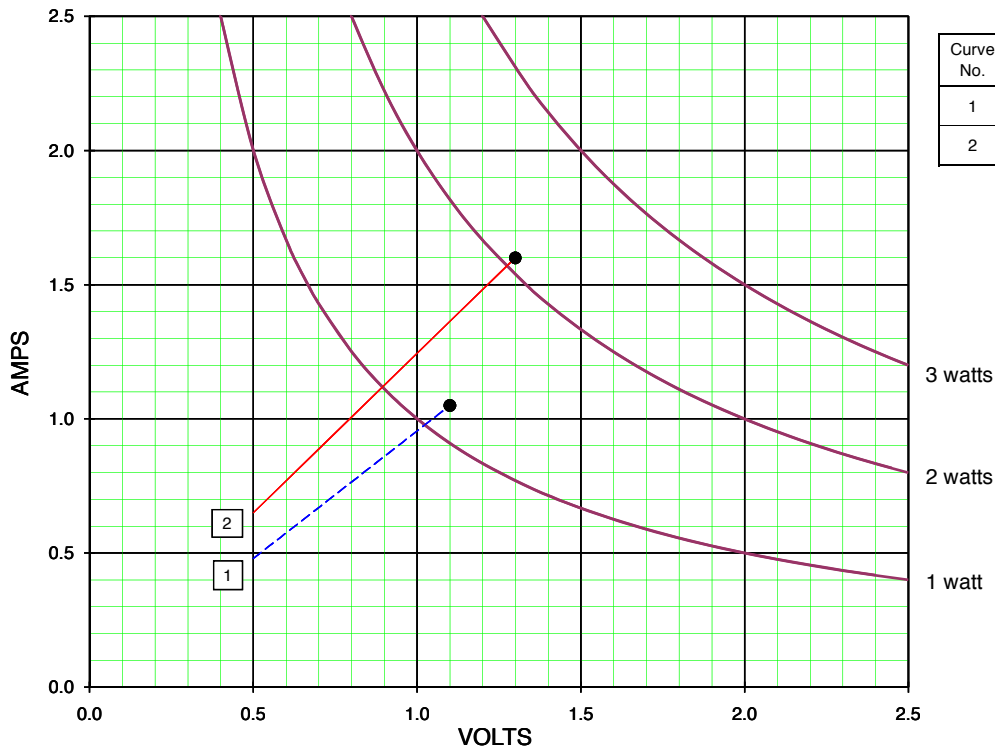
Thus, the wavelength for maximum output varies inversely with the absolute temperature. At a temperature of 1170°K, this maximum is at 2.5 microns. SHA Series steady state emitters are quasi-black-body with an emissivity of 0.70. The emissivity is the ratio of the energy radiated by the source to that which would be radiated by a true black-body at the same temperature.

## Black-body Radiant Emittance

SHA 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.



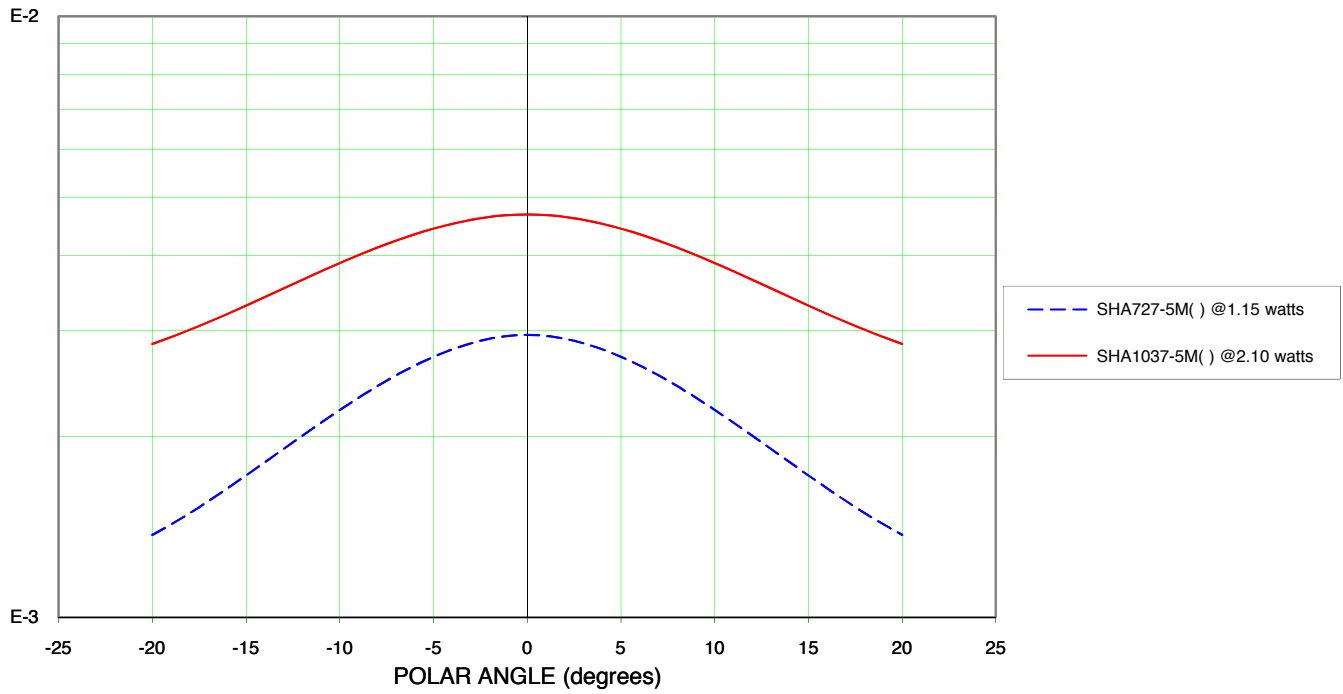
## DC Power Curves (I vs V)<sup>1</sup>



Curve No.	Source Model	Pk DC Power (watts)
1	SHA727-5M( )	1.15
2	SHA1037-5M( )	2.10

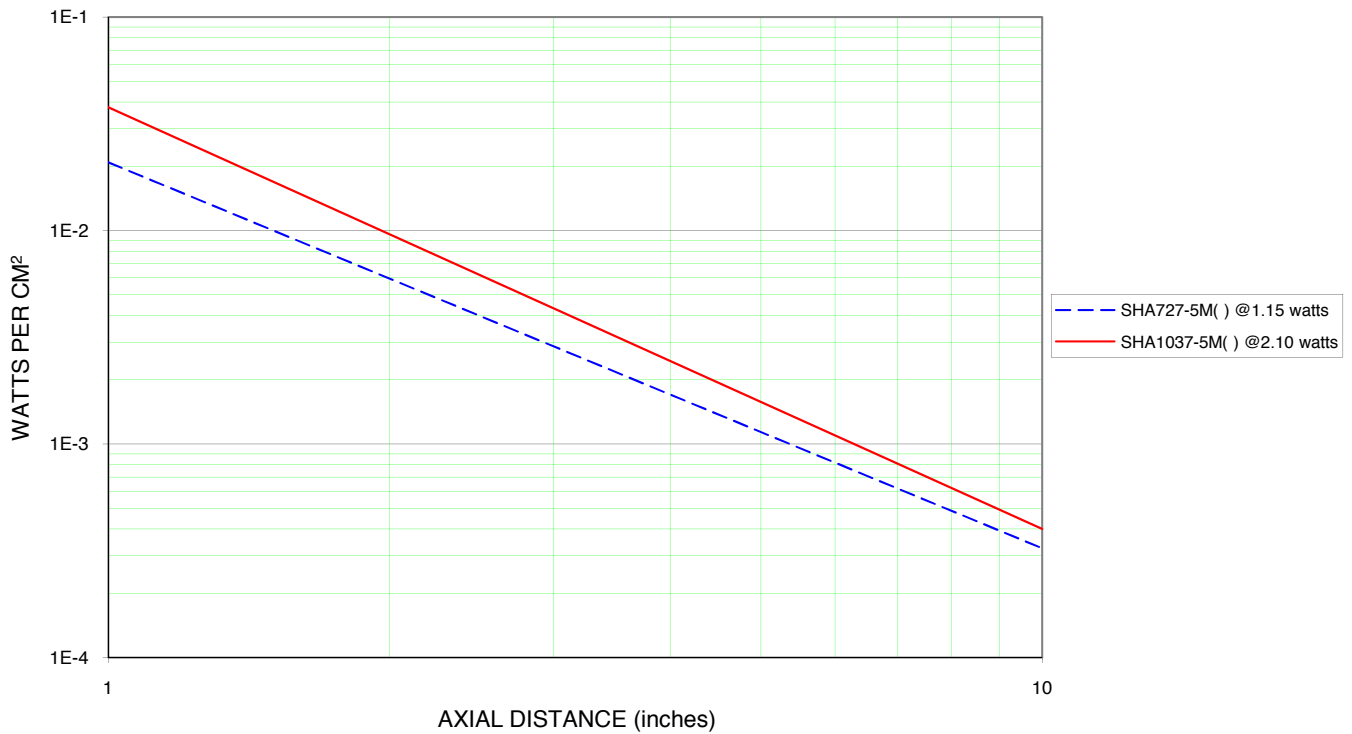
<sup>1</sup> 1170°K at power indicated (●). Exceeding this value will raise element temperature and decrease source lifetime.

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

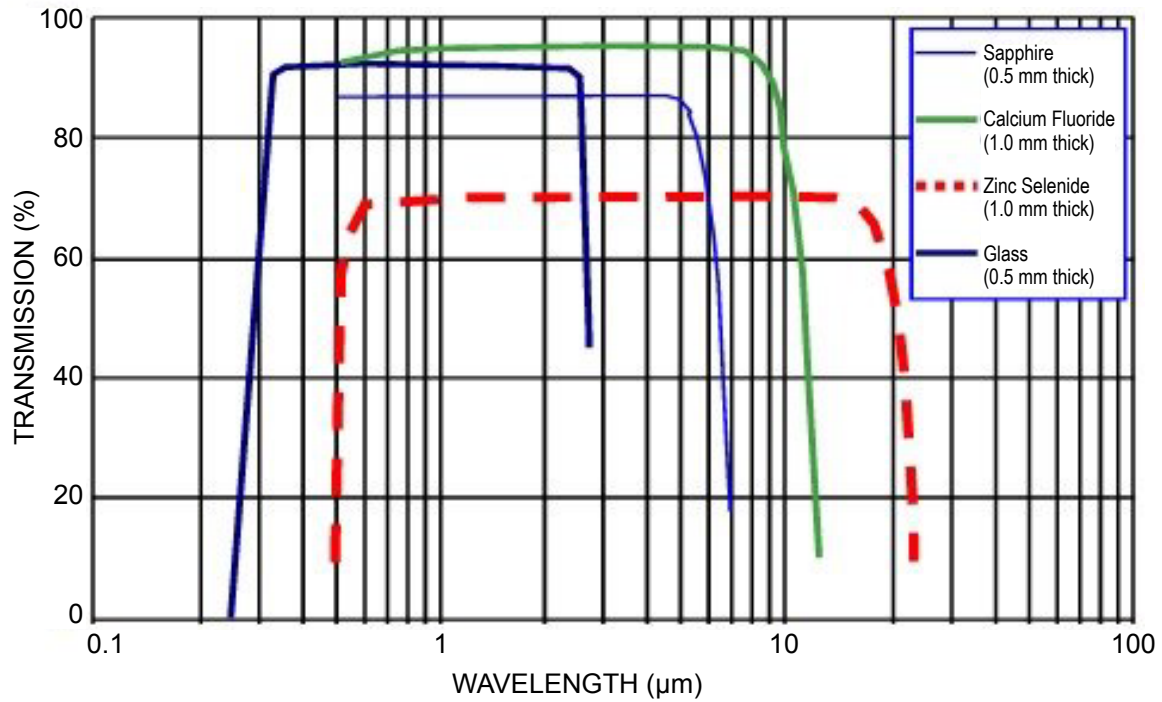


<sup>2</sup> Average of values parallel and perpendicular to axis of element

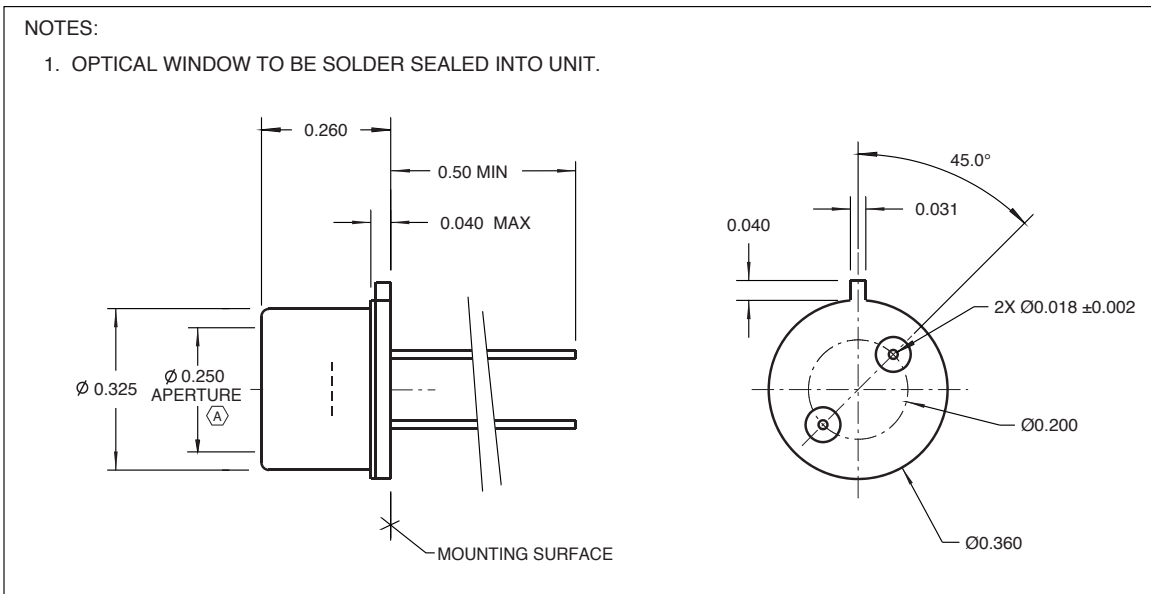
### DC Intensity (@1170°K) vs. Distance



## Window Spectral Transmission Options



## TO-5 Package



## Ordering Information

SHA-XXXXX-YYY

SHA – S Source, H High Power, A Steady State

XXXXX – Filament and Foil Dimensions

YYY – Packaging Options and Window Options

**SHA727-5M0 (40100)** High Power Steady State Emitter 727 in TO5 Windowless Package

**SHA1037-5M0 (40099)** High Power Steady State Emitter 1037 in TO5 Windowless Package

March 11, 2016

Page 4 of 4