



# Steady-State Emitters

## STEADY-STATE EMITTERS-SA SERIES

Cal Source SA-series infrared (IR) emitters are designed to be used as steady state (DC) emitters of blackbody radiation.

The radiating element in the steady-state emitters is a coiled filament of a Cal Sensors specific material with a specialized coating to give an emissivity of 0.70. Radiated output closely emulates a blackbody in spectral distribution. SA-series emitters are designed to operate at a rated filament temperature of 1170° Kelvin.

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. Without a reflector, the radiating element approximates an isotropic point emitter.

### Drive Circuit

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

### Lifetime

All standard emitters have mean times to failure (MTBF) greater than 30,000 hours at the maximum rated power input. Operation of the element above this input power may significantly reduce the lifetime.

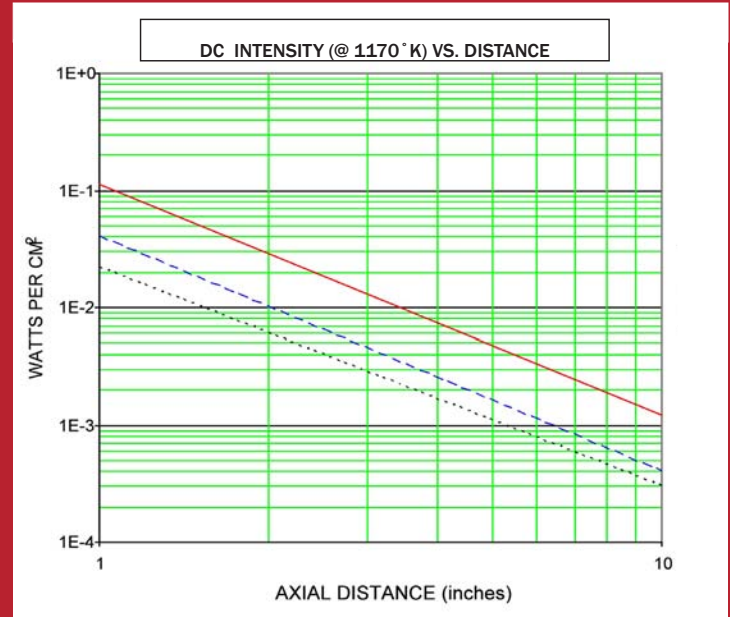
### Filament Temperature vs. Input Power

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 blackbody spectrum is expressed by Wien's law as:

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

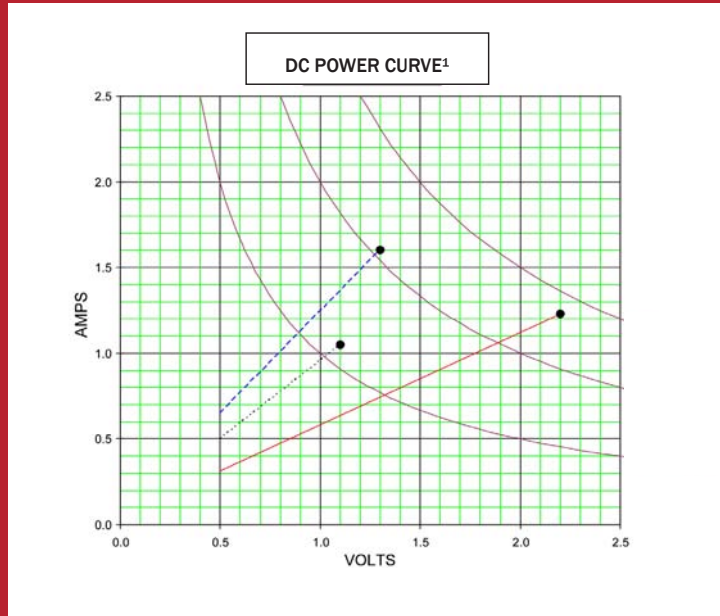
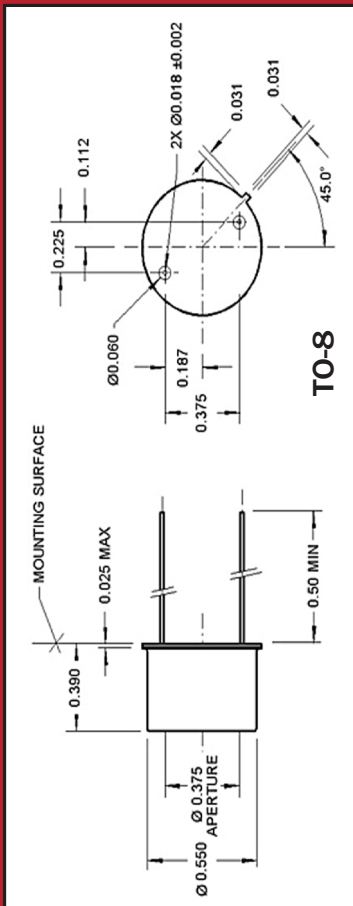
Thus, the wavelength for maximum excitation varies inversely with the absolute temperature. At a temperature of 1170°K, this maximum is at 2.5 microns. Cal Source Steady State emitters are quasi-blackbody with an emissivity of 0.70. The emissivity is the ratio of the energy radiated by the source to that which would be radiated by a true blackbody at the same temperature.

# SA-Steady-State Emitter



<sup>1</sup> Average of values parallel and perpendicular to axis of element

- SA727-5M2 (@1.15 watts)
- SA1037-5M2 (@2.1 watts)
- SA10510-8M2 (@2.7 watts)



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

