



Cal**Sensors**

# High Frequency Pulsable IR Emitters

## HIGH FREQUENCY (IR) SOURCE- SPF SERIES

Cal Source™ SPF-Series infrared (IR) emitters are designed to be used as fast pulsed sources of blackbody radiation. The design has been optimized for high modulation depth and optical output.

The radiating element in the pulsable emitters is an ultra-thin Cal Sensors specific metallic foil configured so that radiation from both sides of the heated foil is efficiently directed out of the package along the optic axis. The foil material has an emissivity of 0.88 and closely emulates a blackbody source in spectral distribution. SPF-series emitters are designed to operate at a rated maximum foil temperature of 1000° Kelvin.

Standard SPF-series emitters are offered in sealed TO-5 packages.

Sapphire is the only window available at this time. SPF-series emitters are offered with an integral reflector. Standard parabolic reflectors provide near collimated and uniform radiation output. Optional elliptical reflector is available.

### Lifetime

The mean time before failure (MTBF) is greater than 20,000 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

The SPF pulsable emitter is designed to operate with maximum element temperatures of approximately 1000° K (727° C) at the rated input power. 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 consistent output. The heat sink must limit the package temperature to not more than 120° 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,

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

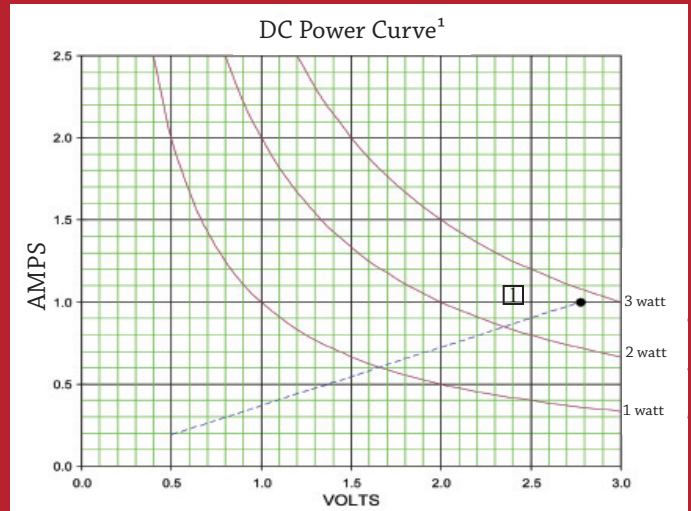
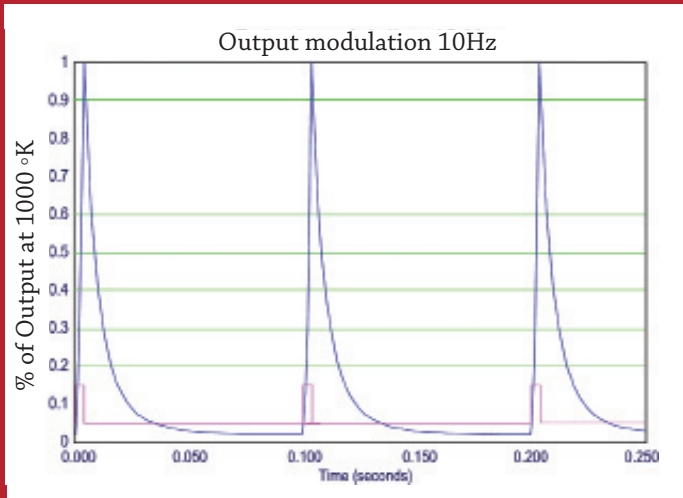
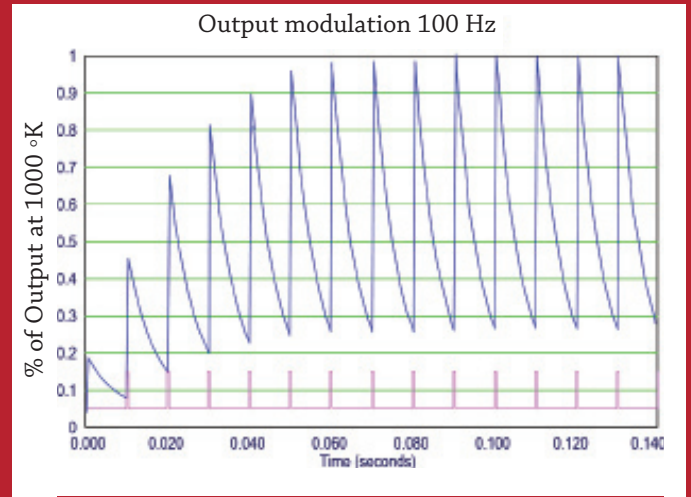
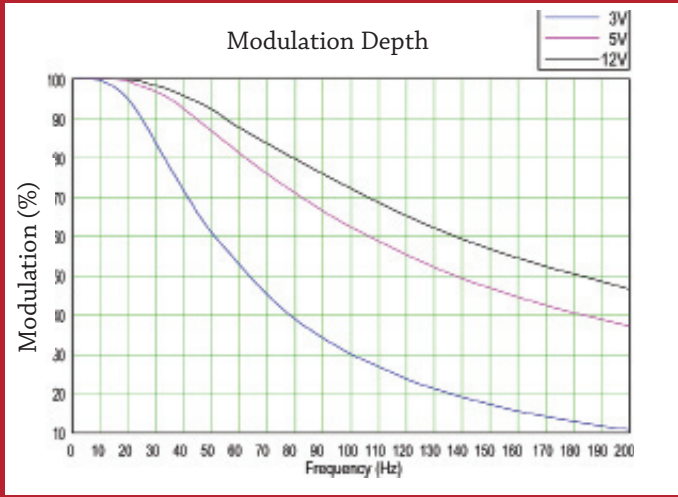
Thus, the wavelength for maximum excitation varies inversely with the absolute temperature. For 1000° K this maximum is at 2.9 microns.

The input pulse should have sufficient energy to produce a maximum filament temperature of 1000K.

Example: 12 volts was applied (10.4v at device) in pulses of short duration. (390 microseconds at 100Hz)

Other voltages and pulse durations are possible. See website for more information.

# (SPF) Pulsable Emitters in a TO-5 Package



| Curve No. | Source Model | Pk DC Power (watts) |
|-----------|--------------|---------------------|
| 1         | SPF220-5M2   | 2.78                |

<sup>1</sup> 1000°K at power indicated (•). Exceeding this value will raise element temperature and decrease source lifetime.

