

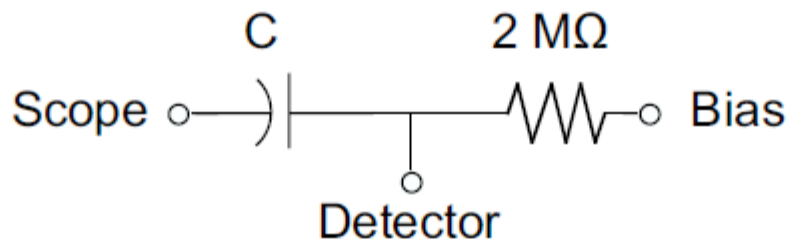


## DIAMOND RADIATION DETECTOR OPERATOR'S GUIDE

1. The detectors are shipped after being tested with bias voltages up to 500 V. The normal operation voltage is 50-100 V. The polarity of the bias is irrelevant.
2. Typical detector sensitivity at 100 V bias is  $3 \times 10^{-4}$  A/W. Each healthy PCD must be calibrated as the value of S can vary by 2X. Sensitivity changes linearly with change in bias voltage.
3. If your source emits P watts (through whatever filtration you may need or want), the detector is at a range R, the detector has an area A and sensitivity S (amps per watt), then the signal level into a 50 ohm load will be:

$$\text{Volts} = 50 * P * A * S / (4 \pi R^2).$$

4. The following is an example of a bias circuit that can be used to measure current conducted through the detector. The capacitor should be large enough to provide a current through the duration of the radiation pulse (100nF is typical).



5. In the event that voltages >10% of the bias voltage are generated at the scope, the corrected voltage can be obtained from the following equation:

$$V_c = V_m / (1 - V_m / V_b)$$

Where  $V_b$  is the applied bias voltage,  $V_m$  is the measured signal, and  $V_c$  is the corrected signal.

5. DRDs can be cleaned using an ultra-sound cleaner by immersing the detector in isopropyl alcohol.