USING THE LOW IMPEDANCE InAs PHOTODIODES

The IA-series photodiodes operate in a similar fashion as more common silicon or InGaAs devices in that they generate a current proportional to incident radiation within their sensitive wavelength region -- 1 to 3.4 microns. A number of differences in their electrical characteristics however make it essential that the user designs an optimized amplifier circuit for these specific devices.

Parameters to consider:

1) Shunt resistance -- the low value of the shunt resistance is the primary problem in interfacing the detector. With typical values of 10 ohms (IA-020) to 25 ohms (IA-010) these photodiodes look quite different. Some circuit considerations:

a) DC offset voltages -- the output offset voltage is determined by the amplifier's input offset multiplied by the voltage gain of the circuit. High impedance photodiodes typically have very low voltage gains in a transimpedance amplifier, but a 10 ohm IA-series device with a 10k feedback amplifier has a voltage gain of 1000. Choose an amplifier with good offset properties. Also consider a low gain 1st stage with an AC-coupled 2nd stage if DC information is not critical.

b) Noise voltages -- the input noise voltage, not the input noise current of the amplifier is critical. Choose an amplifier with as low as possible input noise voltage.

2) Series resistance -- the series resistance of these devices is only a few ohms, but this can cause problems because the level is significant compared to the shunt resistance. The series resistance lowers the overall responsivity and causes a non-uniformity in response across the active area (a fall-off as the light moves away from the electrical contact area).