



From Deep UV to Mid-IR

OPTO DIODE

An ITW Company

Proper Use of AXUV, SXUV, and UVG Detectors (EUV Photodiodes)

1. AXUV/UVG/SXUV series EUV photodiodes can be used in air, ambient gases such as helium, argon, nitrogen, or under vacuum conditions lower than 10^{-10} torr. These photodiodes can be vacuum baked up to 150°C. Operation can occur from -20°C to 80°C in vacuum or ambient gas environments.
2. It is advisable to check open devices prior to placing into the measurement system if the protective cover has been removed. Do this by connecting the leads of the diode to the positive and negative terminals of a picoammeter or electrometer and exposing the diode to room light. As an example, an uncoated 1cm x 1cm photodiode should produce an output current of tens to hundreds of micropamps depending on the light intensity. A filtered photodiode of the same size will produce only a few nanoamps in the same light conditions. Alternatively, a table lamp or flashlight may be used if there is not enough ambient room light. *Multimeters will not give meaningful resistance readings for a photodiode and should not be used to determine device functionality in any mode.*
3. To avoid contribution of the photo emission current to the photo generated current, the signal should be read from the p-region (anode) of the diode with the n-region (cathode) grounded. A significant photo emission current contribution has been noticed in the AXUV photodiodes in the 70nm to 140nm region when the detector is not connected as described.
4. Condensables within the vacuum system in which the EUV photodiodes are used must be maintained at as low a level as possible. A surface film deposited on the diode will absorb radiation and may even fluoresce. In either of these cases, a permanent film could result from interaction with XUV radiation leading to irreversible changes in device efficiencies.
5. With windowless EUV photodiodes, precaution must be taken to not breathe, sneeze, or touch the active area of the device. If by accident the active area is contaminated, the surface may be cleaned by a clean room swab dipped in electronic grade acetone or alcohol. CAUTION: EUV photodiodes have a very shallow junction and aggressive swabbing may damage the device. Use a gentle swabbing action only. All the filtered diodes with carbon and silicon passivating coating can also be cleaned in the same method. For other filtered diodes please contact the factory before attempting to clean.
6. Care must be taken to avoid disturbing the delicate wire bonds which connect the photodiode die to the package pins. If the wire gets pushed down to the die, it will result in a short. It may be possible to gently lift the bond off of the chip using a fine wire or needle. *Not all parts can be reworked in the event of a wire break. The warranty is voided if the wire is broken by the user.*

7. Some of the EUV photodiodes are designed with protective epoxy over the wire bond. The protective epoxy will prevent wire breakage in the event of very light accidental brushing of the wire bond. However, strong thermal changes, such as quenching or instantaneous heating, may cause the wires to break due to the difference in Thermal Coefficient of Expansion (TCE) between the wire and epoxy. Ensure products with this feature are only used within the stated temperature range and are not subjected to thermal stresses.
8. The linear range of EUV photodiodes can be increased several times by applying a small reverse bias voltage. In high radiation conditions the diode saturation level can be increased with an application of usually 1 to 2 volts. In extremely high radiation environments certain EUV photodiodes can be biased at 100V to operate in the linear range. Utilize a simple series circuit consisting of the voltage source, photodiode and current measuring device when measuring in a CW mode. Always operate EUV photodiodes in a reverse bias mode. Operating in the forward mode may damage the detector. When doing pulse energy measurements it is recommended that an external bias tee is used, such as the BT250.
9. When using small active area EUV photodiodes, it is important that the total light energy is contained within the active area if an absolute measurement is needed. When the diode is overfilled, or used in a flooded mode, and if the beam is hitting the diode periphery there is a lesser unknown quantum efficiency in this area. Detectors with large active areas are available for measuring large energy beams.
10. EUV photodiodes may only be connected per the instructions on the individual data sheets. Most devices may be directly soldered to the pins while following the stated temperature limit and duration. Flux will contaminate the photodiode so it is important to leave the protective window on during the soldering and cleaning process. All flux should be cleaned from the package before use by utilizing D.I. water, alcohol, or acetone as appropriate.