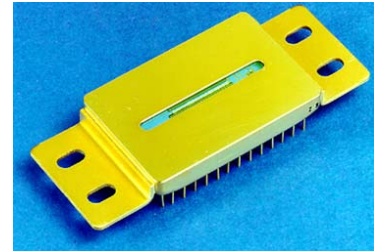


## Application Note

### How to Properly Attach an SUI Device to a Heat Sink



The SUI Linear Array's temperature is controlled utilizing a thermoelectric cooler (TEC). This device moves heat from the array to the base of the package. We guarantee at least a 40°C temperature difference between the array and the outside of the package when 1.38 A are applied to the TEC. It is critical to remove the heat from the bottom of the package in order to obtain maximum performance from the device. The degree to which heat is removed from the base of the package determines the temperature to which the package rises and thus, the array temperature that will be achieved with the 40°C temperature difference.

It is important to attach the array to a clean, flat, metal surface because it is the first link in the heat sink system that is necessary to run the array. This metal should be thermally attached to a heat exchanger. At a minimum the heat exchanger should be a metal, with a large surface area, that is exposed to air. The temperature rise of the base of the package is determined by:

- the thermal conductance of the heat sink.
- the thermal conductance between the heat exchanger and the ambient air.
- the thermal conductance of the interfaces between the package and the heat sink and the heat sink and the heat exchanger.

There are two ways to obtain good thermal contact between the array and the heat sink.

The preferred method is to use a combination of a 0.01 in.-thick indium shim and thermal compound or grease. Indium shims are available from SUI (P/N 2404-0001) and good quality thermal grease can be obtained from Wakefield Engineering (P/N 120-2). The following describes a procedure for attaching the array to the heat sink. In the absence of indium foil, increase the thickness of the thermal grease correspondingly and follow these procedures.

To heat sink with indium the indium should be placed between the array package and the metal heat sinking surface with thermal grease on both sides of the indium. It is critical that the indium does not touch any of the pins; indium is electrically conductive and will short pins together. The indium is an excellent thermal conductor that deforms when the array is screwed down to the heat sink. The thermal grease fills in the gaps at both interfaces. The indium should be centered between the pins for maximum performance and to avoid electrical short circuits. (Figure 1) The thermal grease should be approximately 0.001 in. thick. Care must be taken to ensure that all surfaces are clean before use because dirt will act as a thermal resistor. The grease should be spread evenly and it should cover the entire surface. Any excess grease will ooze out of the sides upon tightening and can be easily wiped away. It is better to have too much grease than too little.

Once the array is placed on the heat sink it must be physically attached utilizing the screw-holes provided on the flanges of the package. Screws should not be tightened beyond 14 in-oz. The use of a torque screwdriver is recommended to prevent over tightening of the screws on the flanges. They should be tightened down in an order similar to Figure 2 where one tightens one side and then the opposite side. This prevents the thermal grease from being pushed all to one side. It provides even distribution of the downward pressure.

the array package and your heat sink system. Measure the temperature drop across the interface to test the attachment. To do this you only have to measure the temperatures of the package and a nearby point on the heat sink. The temperatures would be the same if the interface were perfect; a 2°C difference is considered adequate. The greater the temperature difference between the package and the heat sink the lower performance will be from the TEC.

Use of the indium and the thermal grease provides excellent thermal conduction between

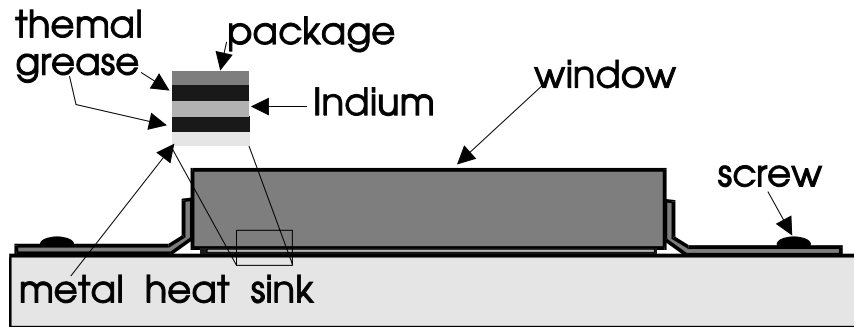


Figure 1. Attachment of the array to the heat sink with the indium and thermal grease combination.

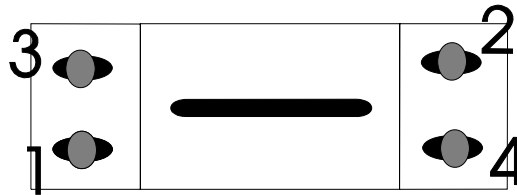


Figure 2. Order for attaching the hold-down screws on the array.

If you need further technical support, please contact our sales department via email [sui\\_support@goodrich.com](mailto:sui_support@goodrich.com) or call us at 609-520-0610.

**About Goodrich's SUI Team:** Founded in 1991, SUI (Sensors Unlimited, Inc.) is the leading manufacturer of indium gallium arsenide (InGaAs) PIN and avalanche photodiode arrays that are used in shortwave and near infrared imaging for military, industrial, spectroscopic, machine vision, and telecommunications applications. SUI provides InGaAs photodiode array processing as a foundry service and designs custom readout integrated circuits for unique imaging applications within its ISO 9001 certified facility. For more information, visit [www.oss.goodrich.com/sui](http://www.oss.goodrich.com/sui).