



Technology Brief

Air Cooled Heat Pipe Assembly

The following photos of a complex heat sink assembly demonstrate a wide variety of high technology cooling solutions. This cooler for an RF power amplifier is capable of dissipating many hundreds of Watts of power at a thermal resistance of less than 0.02 C/W in high-speed, forced airflow. It uses a combination of heat pipes with flat fins, brazed copper and folded fins to take advantage of a limited enclosure space and still meet the required cooling objectives.

In detail these individual cooling technologies are:

- **Brazed Aluminum** – The heat input section of this cooling assembly is made from two pieces of high conductivity aluminum machined to accept 12 heat pipes, 6 from each side. This heat spreading section also provides for the attachment of the RF amplifier. These machined base plate halves are brazed together, along with the heat pipes forming a void-free “sandwich”. This central assembly is the heart of the module. The folded fin opposite the mounting surface and the heat pipes with flat plate fins are brazed in place in one manufacturing step.
- **Heat Pipes**- Uniformity of the mounting surface temperature is critical to this cooling application. The heat pipes, in conjunction with machined copper heat spreader provides this consistent heat spreading capability. The assembly uses 12 sintered wick, water / copper heat pipes embedded halfway into the base plate. These pipes move heat away from the module reducing temperature rise while maintaining the overall height of the cooler to fit within the available envelope.
- **Folded Fins** – Extended surface in the form of folded fins remove heat directly from the base mounting plate. These fins are also made of copper and metallurgical bonded to the heat spreader. Based on their height, thickness and conductivity these fins approach 100% efficiency in forced air-cooling.
- **Finish** – Electroless nickel plating is used to help resist corrosion in field applications and add a cosmetic quality to the assembly.

This complex cooler is, of course, a custom part. The design of the part is the result of a long effort by both customer and Thermshield engineers. This type of collaborative effort and the expertise required to solve your particular cooling problem is available with only a phone call to our engineering department. Our low cost manufacturing and wide range of available cooling technologies can be used to solve most any thermal challenge. If this type of compact, high power cooling is needed on your next project please call Thermshield at (603) 524-3714.



