

Portable Electronics Passive Cooling

Design Goals and Constraints

- Low CPU heat output (less than 10 Watts).
- Limited space available.
- A fan is not desired.
- Silent solution required.
- Weight is a primary concern (direct affect on the marketing of the end product).

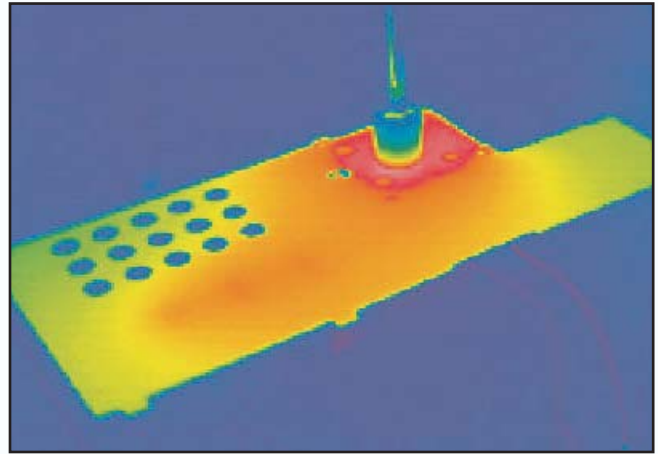


Figure 2: Infrared Image

Solution: Cold plate seen in Figure 1

Due to the requirement of a silent solution, Enertron engineers did not pursue a fan solution. Natural convection and radiation would be the primary modes of heat dissipation. For these two modes, a large surface area would be the key.

A large flat aluminum plate was used to spread the heat. Aluminum was chosen due to its high conductivity, low weight, and low cost. However, out of weight concerns, a thin plate was required. To increase the heat spreading across the plate, a heat pipe was integrated into the assembly. The heat pipe adds a highly efficient thermal path from the processor to the far end of the aluminum plate. This allows the heat to spread more evenly across the plate resulting in a more uniform temperature across the plate.

Because the solution did not require a fan, the solution was silent, drew no additional power, and was highly reliable. The geometry of the cold plate could be easily modified to allow it to be designed into the application, without the need to rearrange any major components or increase the size of the enclosure.

Similar solutions have been used in other models of notebook PCs as well as conference room speakerphones and other consumer electronics.

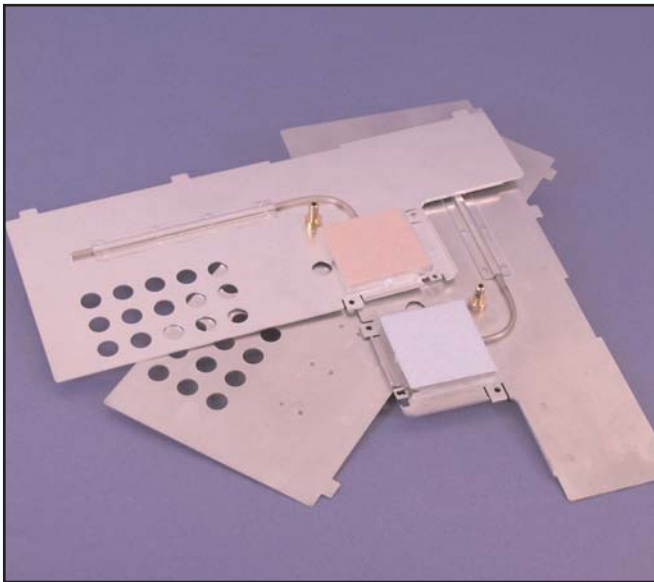


Figure 1: Cold Plate