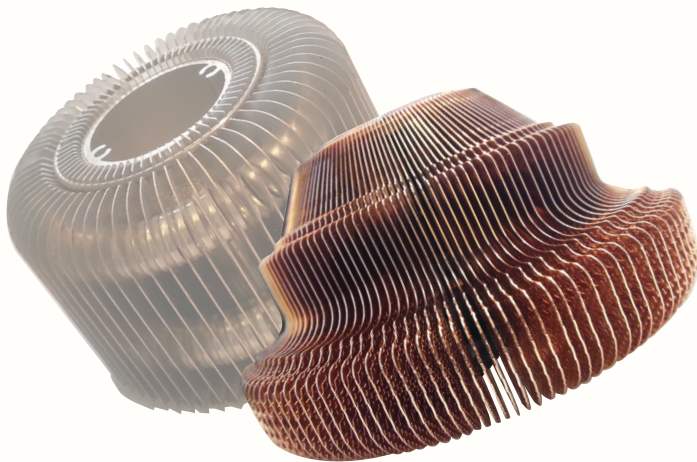
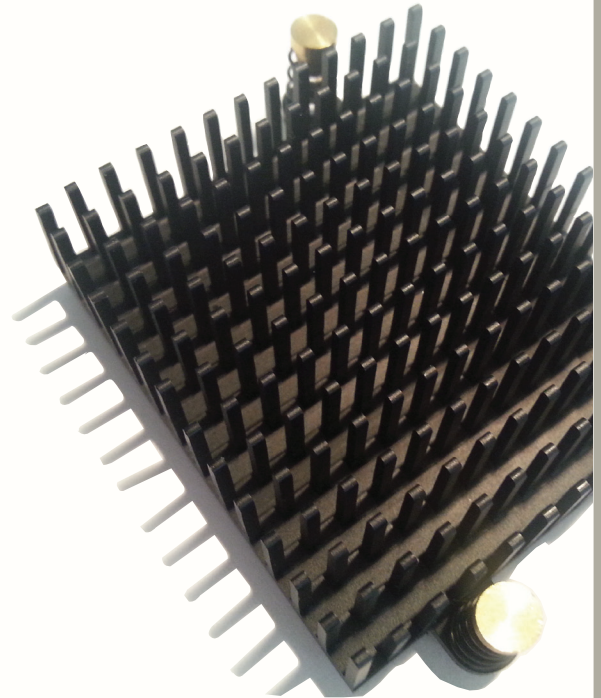


Board Level & BGA Heat Sinks

Board Level heat sinks are so named because they are generally attached both to the device and the PCB. Usually constructed as either a stamping or an extrusion, these heat sinks are designed for common package sizes like T0220, T0247 and D2pak.

BGA heat sinks are mounted to BGA devices, but are actually just simple extrusions. BGA heat sinks are usually crosscut to convert the extruded fins into pins which allow them to be used in more diverse application. The number and size of the crosscuts are dependent upon the environment.



Folded, Bonded, Stacked Fin

Folded Fin heat sinks are good solution when looking for a medium to high density fin structure that is short in height ($<2'$). Generally formed from either copper or aluminum, a long sheet of material is folded back and forth to produce the fins. Depending upon the fin spacing and height, the fin tips can be flat or rounded. There are also special configurations like lanced offset and wavy which can be used to improve the heat transfer ability.



Accessories

[Thermal Cooling Products]

MiniMetal Ltd., offers precision clamps, wedgelocks, front panels and thermal interface material as a way to complete the package solution.

Precision clamps used to secure SCRs and other puck-style devices to the heat sink can be combined with the heat sink to form an easy to assemble kit. This kit could also include a thermal interface material. The interface material can also be applied to the heat sink prior to shipping to provide greater ease of assembly. MiniMetal Ltd., does offer a few standard interface materials (grease, epoxy), but we work with all interface material manufacturers and can pre-apply most materials to the heat sink.



MiniMetal Ltd., also offers a line of wedgelocks which are used with heat frames / conduction plates to provide the necessary clamping force to ensure good thermal transfer. The wedgelocks are offered in a variety of styles and profiled to suit your application. Just like the clamps, the wedgelocks can be kited with the heat frames or shipped separately.

MiniMetal Ltd., offers front panels associated with VME, PCI, ATCA and other industry standards. We stock components from all major manufacturers electronic packaging which can be installed on the front panels. Front panels can be delivered with or without silk-screening to meet the customers final needs.



Forced Convection

[Thermal Cooling Products]

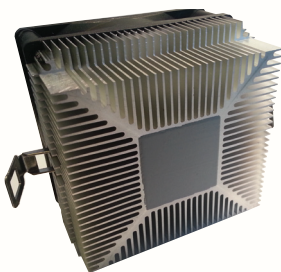
Forced convection is a mechanism in which the fluid motion is generated by an external source like a pump, fan or other device.



While the term forced convection can be used to refer to any fluid, it is most commonly associated with force air cooling. Because of the usually high air

air speeds associated with forced convection, significant amounts of heat can be transported quickly and efficiently.

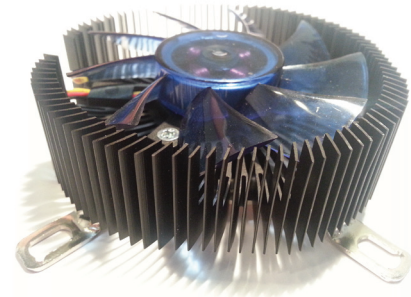
The amount of surface area on the heat sink is an important critical to help meet the thermal performance, but too much surface area will cause the heat sink to have a large pressure drop. The more pressure drop associated with the heat sink, the more strain is put on the fan preforms. Minimetal engineers will help find optimal operation point to achieve the thermal requirements.



Skived, Zipper Fin

Skived Fin sink can be an alternative to extruded heat sinks when looking for a fin density which can't be achieved by extrusion technology.

Skived heat sinks can be manufactured from either copper or aluminum and usually have 0.5mm (0.020") thick fins.



Fans

MiniMetal Ltd., manufactures a line of DC axial fans used on fan heat sinks which can be used on BGAs, VGAs and CPU coolers. The fans range in size from 30x10mm to 120x38mm with the most common sizes in between. The fans are available in 5 and 12 volt as the most common with a couple of larger fans available in 24V and 48V for use in industrial applications.



Natural Convection

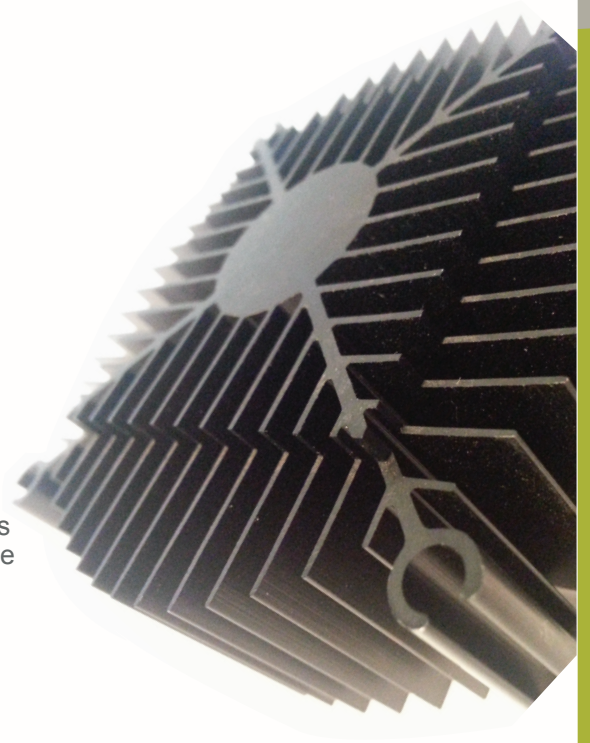
[Thermal Cooling Products]

Natural convection cooling where there is no forced air flow from a fan, or other source. Heat is conducted and radiated to the air within the heat sink's fins.

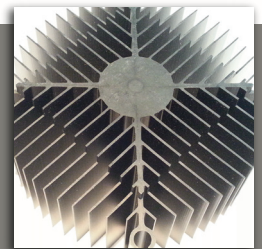
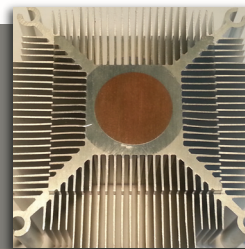
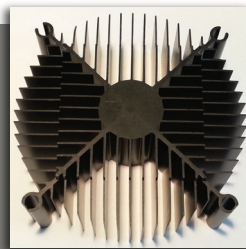
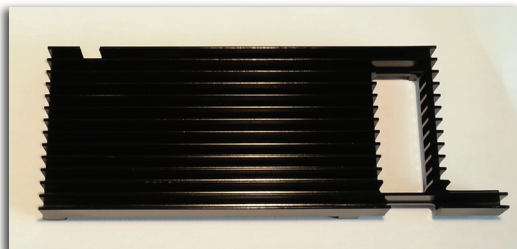
The higher temperature air is less dense than the surrounding air and rises out of the heat sink creating airflow that carries heat away from the heat sink fins.

The fluid velocity is very low in natural convection which limits the ability of the heat sink to transfer energy to the environment. To improve the heat sink ability, the surface area of the heat sink should be as large as permitted by the application.

Radiation also plays a major role in the performance of the heat sink and so the heat sink should be treated, either anodized or painted. This surface treatment improves the surface emissivity or its ability to radiate heat to other objects in the environment. When designing a heat sink for natural convection, the orientation should be vertical and the fins should be widely spaced, about $\frac{1}{4}$ ".



Extruded heat sinks are the most common heat sinks used for thermal management today. They are manufactured by pushing hot aluminum billets through a steel die to produce the final shape. The most common aluminum alloy is 6063-T5, but other 6XXX alloys can also be examined as needed. When the material is extruded, the initial sticks are 30-40 feet in length and are very soft. The material is stretched by grabbing both ends to produce a straight stick. After stretching, the material can be either air or over aged depending upon the required final hardness of the material.





LED Heat Sinks

Led applications are thermally challenging because of their small size, high power dissipation, complex environment and cost restrictions. LEDs are small in size and can be clustered together to produce more / brighter light. The small size means that the spreading of the heat from the LED into the heat sink is extremely important. To improve the spreading, many LEDs are mounted to metal-clad PCBs. While LEDs are electrically efficient, they are only about 30% efficient from thermal prospective and that leads to thermal challenges.



Contact Us

Head Office

Shenzhen - China Branch

Minimetal China Ltd.
1-C, Sea View Garden, Xinhua
Rd.
Shekou of Shenzhen
China 518067

Logistic Center

Shenzhen - China

101, Fu Jing Shan Industrial Area
Nanyue of Longgang District,
Shenzhen, China
T: (86) 8921 8594

Corporate

Hong Kong

Minimetal HK Ltd.
T: (852) 6954 6545

Israeli Direct Line

T: (972) 3 911 6233
www.minimetal.net
sales@minimetal.net

