ABSTRACT

A laminating heat sink includes a first heatsink plate, at least one second heatsink plate overlapping the first heatsink plate, and a plurality of fixing bars each extended through the first heatsink plate and the second heatsink plate to combine and fix the first heatsink plate and the second heatsink plate. The first heatsink plate has a first side combining a heat source and a second side abutting the second heatsink plate. Thus, each of the fixing bars is extended through the first heatsink plate and the second heatsink plate so that the heat produced by the heat source is directly introduced by the fixing bars and is transferred through the first heatsink plate and the second heatsink plate easily and quickly so as to achieve a quick heat dissipation effect.
LAMINATING HEAT SINK HAVING ENHANCED HEAT DISSIPATION CAPACITY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

The present invention relates to a heat sink and, more particularly, to a heat sink for an electronic device, such as the CPU (central processing unit), LED (light emitting diode), IC (integrated circuit), rectifier, resistor, capacitor, inductor, and the like.

[0002] 2. Description of the Related Art

An electronic device or element, such as the CPU (central processing unit), LED (light emitting diode), IC (integrated circuit), rectifier, resistor, capacitor, inductor, and the like, is a heat source which readily produces a high temperature during operation, so that it is necessary to provide a heat sink to carry away the greater heat produced by the heat source so as to achieve a heat dissipation effect and to enhance the lifetime and working efficiency of the heat source. A conventional heat sink generally comprises a heatsink element, such as a metallic heatsink fin, a heat conductive tube, a chill enabling chip, a heat dissipation board, a cooling fan or the like, so as to achieve a heat dissipation effect. However, the conventional heat sink cannot dissipate the heat from the heat source exactly and quickly, thereby greatly decreasing the heat dissipation efficiency. In addition, the conventional heat sink has a very complicated construction, thereby increasing the costs of fabrication.

BRIEF SUMMARY OF THE INVENTION

[0005] In accordance with the present invention, there is provided a heat sink, comprising a first heatsink plate, at least one second heatsink plate overlapping the first heatsink plate, and a plurality of fixing bars each extended through the first heatsink plate and the second heatsink plate to combine and fix the first heatsink plate and the second heatsink plate.

[0006] The first heatsink plate is made of a non-metallic material having great heatsink feature. The second heatsink plate is made of a non-metallic material having great heatsink feature. Each of the fixing bars is made of metallic material having great heat conductivity.

[0007] The first heatsink plate has a surface provided with a plurality of first through holes to allow passage of the fixing bars. The second heatsink plate has a surface provided with a plurality of second through holes to allow passage of the fixing bars. Each of the fixing bars is extended through the first through holes of the first heatsink plate and the second through holes of the second heatsink plate.

[0008] The first heatsink plate has a first side adapted for combining a heat source and a second side abutting the second heatsink plate. The heat produced by the heat source is directly introduced by the fixing bars and is transferred through the first heatsink plate and the second heatsink plate.

[0009] Each of the fixing bars has a first end and a second end. The first end of each of the fixing bars is electrically connected with an electrical connecting terminal, and the second end of each of the fixing bars is electrically connected with an external power supply. The electrical connecting terminal is connected with the heat source and is located outside of the first heatsink plate.

[0010] Each of the fixing bars has a hollow structure and has an inner portion provided with a passage to allow passage of a conducting wire. The conducting wire has a first end and a second end. The first end of the conducting wire is electrically connected with the electrical connecting terminal, and the second end of the conducting wire is electrically connected with the external power supply.

[0011] The laminating heat sink further comprises a plurality of heat conducting bars each extended through the first heatsink plate and the second heatsink plate. The first heatsink plate has a plurality of first heat conducting holes to allow passage of the heat conducting bars. The second heatsink plate has a plurality of second heat conducting holes to allow passage of the heat conducting bars. The heat conducting bars transfer the heat produced by the heat source to the first heatsink plate and the second heatsink plate.

[0012] The laminating heat sink further comprises at least one interface layer mounted between the first heatsink plate and the second heatsink plate.

[0013] The primary objective of the present invention is to provide a heat sink having an enhanced heat dissipation capacity to dissipate a heat from a heat source quickly.

[0014] According to the primary advantage of the present invention, each of the fixing bars is extended through the first heatsink plate and the second heatsink plate so that the heat produced by the heat source is directly introduced by the fixing bars and is transferred through the first heatsink plate and the second heatsink plate easily and quickly so as to achieve a quick heat dissipation effect.

[0015] According to another advantage of the present invention, each of the fixing bars can function as an electrode.

[0016] According to a further advantage of the present invention, the heat conducting bars transfer the heat produced by the heat source to the first heatsink plate and the second heatsink plate quickly so as to achieve a quick heat dissipation effect.

[0017] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0018] FIG. 1 is a front cross-sectional view of a heat sink in accordance with the preferred embodiment of the present invention.

[0019] FIG. 2 is a front cross-sectional view of a heat sink in accordance with another preferred embodiment of the present invention.

[0020] FIG. 3 is a front cross-sectional view of a heat sink in accordance with another preferred embodiment of the present invention.

[0021] FIG. 4 is a front cross-sectional view of a heat sink in accordance with another preferred embodiment of the present invention.

[0022] FIG. 5 is a front cross-sectional view of a heat sink in accordance with another preferred embodiment of the present invention.

[0023] FIG. 6 is a front cross-sectional view of a heat sink in accordance with another preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Referring to the drawings and initially to FIG. 1, a laminating heat sink in accordance with the preferred embodiment of the present invention comprises a first heat-
sink plate 1, at least one second heatsink plate 2 overlapping the first heatsink plate 1, and a plurality of fixing bars 3 each extended through the first heatsink plate 1 and the second heatsink plate 2 to combine and fix the first heatsink plate 1 and the second heatsink plate 2. Preferably, the laminating heat sink comprises a plurality of second heatsink plates 2 laminating each other.

[0025] The first heatsink plate 1 is made of a non-metallic material having great heatsink feature. Preferably, the first heatsink plate 1 has a porous structure. The first heatsink plate 1 has a first side adapted for combining a heat source “A” (such as an LED and the like) and a second side abutting the second heatsink plate 2. The first heatsink plate 1 has a surface provided with a plurality of first through holes 10 to allow passage of the fixing bars 3.

[0026] The second heatsink plate 2 is made of a non-metallic material having great heatsink feature. Preferably, the second heatsink plate 2 has a porous structure. The second heatsink plate 2 has a surface provided with a plurality of second through holes 20 to allow passage of the fixing bars 3.

[0027] In the preferred embodiment of the present invention, each of the first heatsink plate 1 and the second heatsink plate 2 is made of non-metallic powder having greater heat conductivity, such as Al₂O₃, ZrO₂, AlN, SiN, BN, WC, SiC, C (graphite), crystalline SiC, a-SiC (re-crystalline SiC) and the like. Preferably, the non-metallic powder is AlN or SiC.

[0028] Each of the fixing bars 3 is made of metallic material having great heat conductivity. Preferably, each of the fixing bars 3 is a bolt, rivet, pin and the like. Each of the fixing bars 3 is perpendicular to the first heatsink plate 1 and the second heatsink plate 2. Each of the fixing bars 3 is extended through the first through holes 10 of the first heatsink plate 1 and the second through holes 20 of the second heatsink plate 2.

[0029] When in use, the heat produced by the heat source “A” is transferred to and conducted by the first heatsink plate 1 and the second heatsink plate 2 so that the first heatsink plate 1 and the second heatsink plate 2 can carry away the heat produced by the heat source “A” so as to dissipate the heat. In such a manner, each of the fixing bars 3 is extended through the first heatsink plate 1 and the second heatsink plate 2 so that the heat produced by the heat source “A” is directly introduced by the fixing bars 3 and is transferred through the first heatsink plate 1 and the second heatsink plate 2 easily and quickly so as to achieve a good heat dissipation effect.

[0030] Referring to FIG. 2, each of the fixing bars 3 has a first end and a second end. The first end of each of the fixing bars 3 is electrically connected with an electrical connecting terminal “B”, and the second end of each of the fixing bars 3 is electrically connected with an external power supply. The electrical connecting terminal “B” is connected with the heat source “A” and is located outside of the first heatsink plate 1.

[0031] Referring to FIG. 3, each of the fixing bars 3 has a hollow structure and has an inner portion provided with a passage 30 to allow passage of a conducting wire “C”. The conducting wire “C” has a first end and a second end. The first end of the conducting wire “C” is electrically connected with the electrical connecting terminal “B”, and the second end of the conducting wire “C” is electrically connected with the external power supply. Thus, each of the fixing bars 3 functions as an electrode.

[0032] Referring to FIG. 4, the laminating heat sink further comprises a heat conducting layer 4 mounted between the heat source “A” and the first heatsink plate 1 to transfer the heat produced by the heat source “A” to the first heatsink plate 1 and the second heatsink plate 2 quickly so as to achieve a quick heat dissipation effect. In the preferred embodiment of the present invention, the heat conducting layer 4 is made of a metallic material having great heat conductivity, such as gold, silver, copper, iron, aluminum, cobalt, nickel, zinc, titanium, manganese and the like. Preferably, the heat conducting layer 4 is directly bonded between the heat source “A” and the first heatsink plate 1 by printing or painting.

[0033] Referring to FIG. 5, the laminating heat sink further comprises a plurality of heat conducting bars 5 each extended through the first heatsink plate 1 and the second heatsink plate 2. The first heatsink plate 1 has a plurality of first heat conducting holes 11 to allow passage of the heat conducting bars 5. The second heatsink plate 2 has a plurality of second heat conducting holes 21 to allow passage of the heat conducting bars 5. Preferably, each of the heat conducting bars 5 has a hollow structure. Thus, the heat conducting bars 5 transfer the heat produced by the heat source “A” to the first heatsink plate 1 and the second heatsink plate 2 quickly so as to achieve a quick heat dissipation effect. In the preferred embodiment of the present invention, each of the heat conducting bars 5 is made of a non-metallic material having great heat conductivity, such as gold, silver, copper, iron, aluminum, cobalt, nickel, zinc, titanium, manganese and the like. Alternatively, each of the heat conducting bars 5 is made of a non-metallic material which has a heat conductivity greater than that of the first heatsink plate 1 and the second heatsink plate 2.

[0034] Referring to FIG. 6, the laminating heat sink further comprises at least one interface layer 6 mounted between the first heatsink plate 1 and the second heatsink plate 2. The interface layer 6 is made of is made of a metallic material having great heat conductivity, such as a low temperature solder tin and the like. Preferably, the laminating heat sink comprises a plurality of interface layers 6 mounted between the first heatsink plate 1 and one of the second heatsink plates 2 and between the other of the second heatsink plates 2.

[0035] Accordingly, each of the fixing bars 3 is extended through the first heatsink plate 1 and the second heatsink plate 2 so that the heat produced by the heat source “A” is directly introduced by the fixing bars 3 and is transferred through the first heatsink plate 1 and the second heatsink plate 2 easily and quickly so as to achieve a quick heat dissipation effect. In addition, each of the fixing bars 3 can function as an electrode. Further, the second fixing bars 5 transfer the heat produced by the heat source “A” to the first heatsink plate 1 and the second heatsink plate 2 quickly so as to achieve a quick heat dissipation effect.

[0036] Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

1. A heat sink, comprising:
   - a first heatsink plate;
   - at least one second heatsink plate overlapping the first heatsink plate; and
   - a plurality of fixing bars each extended through the first heatsink plate and the second heatsink plate to combine and fix the first heatsink plate and the second heatsink plate.
2. The heat sink of claim 1, wherein the first heatsink plate is made of a non-metallic material having great heatsink feature; the second heatsink plate is made of a non-metallic material having great heatsink feature; each of the fixing bars is made of metallic material having great heat conductivity.

3. The heat sink of claim 1, wherein the first heatsink plate has a surface provided with a plurality of first through holes to allow passage of the fixing bars; the second heatsink plate has a surface provided with a plurality of second through holes to allow passage of the fixing bars; each of the fixing bars is extended through the first through holes of the first heatsink plate and the second through holes of the second heatsink plate.

4. The heat sink of claim 2, wherein the first heatsink plate has a porous structure; the second heatsink plate has a porous structure.

5. The heat sink of claim 1, wherein the first heatsink plate has a first side adapted for combining a heat source and a second side abutting the second heatsink plate.

6. The heat sink of claim 5, wherein a heat produced by the heat source is directly introduced by the fixing bars and is transferred through the first heatsink plate and the second heatsink plate.

7. The heat sink of claim 1, wherein each of the fixing bars is perpendicular to the first heatsink plate and the second heatsink plate.

8. The heat sink of claim 5, wherein each of the fixing bars has a first end and a second end; the first end of each of the fixing bars is electrically connected with the electrical connecting terminal; the second end of each of the fixing bars is electrically connected with an external power supply.

9. The heat sink of claim 8, wherein the electrical connecting terminal is connected with the heat source and is located outside of the first heatsink plate.

10. The heat sink of claim 8, wherein each of the fixing bars has a hollow structure and has an inner portion provided with a passage to allow passage of a conducting wire; the conducting wire has a first end and a second end; the first end of the conducting wire is electrically connected with the electrical connecting terminal; the second end of the conducting wire is electrically connected with the external power supply.

11. The heat sink of claim 5, wherein the laminating heatsink further comprises a plurality of heat conducting bars each extended through the first heatsink plate and the second heatsink plate.

12. The heat sink of claim 11, wherein the first heatsink plate has a plurality of first heat conducting holes to allow passage of the heat conducting bars; the second heatsink plate has a plurality of second heat conducting holes to allow passage of the heat conducting bars; the heat conducting bars transfer heat produced by the heat source to the first heatsink plate and the second heatsink plate.

13. The heat sink of claim 11, wherein each of the heat conducting bars has a hollow structure.

14. The heat sink of claim 11, wherein each of the heat conducting bars is made of a metal material having great heat conductivity.

15. The heat sink of claim 11, wherein each of the heat conducting bars is made of a nonmetallic material which has a heat conductivity greater than that of the first heatsink plate and the second heatsink plate.

16. The heat sink of claim 1, wherein the laminating heatsink further comprises at least one interface layer mounted between the first heatsink plate and the second heatsink plate.

17. The heat sink of claim 16, wherein the interface layer is made of a metallic material having great heat conductivity.

18. The heat sink of claim 16, wherein the laminating heat sink comprises a plurality of second heatsink plates laminating each other; the laminating heat sink comprises a plurality of interface layers mounted between the first heatsink plate and one of the second heatsink plates and between the other of the second heatsink plates.

19. The heat sink of claim 5, wherein the laminating heatsink further comprises a heat conducting layer mounted between the heat source and the first heatsink plate.

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