

This invention relates to a mounting and cooling device for power electronics cases in an envelope housing an electronics arrangement.

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In such devices, the power electronics cases, e.g. for semiconductors, dissipate heat and are therefore mounted with good thermal contact on dissipators. The latter are generally made from an extruded body in
10 light alloy and comprise a sole plate defining a supporting and mounting plane for the power cases, as well as heat dissipation fins oriented substantially perpendicular to the mounting plane.

15 To the device is often added a ventilation system which accelerates the evacuation of the heat coming from the cases and transmitted to the sole plate and to the fins.

20 In a known device of the type described, the heat dissipator is fixed to lateral walls of the envelope which are perpendicular to the mounting plane of the cases, and this by means of screws of axis parallel to this plane. The screws are engaged, either in nuts
25 installed in slide rails of the sole plate, or in threaded orifices of the sole plate, which imposes a notable extra thickness of the latter and therefore entails extra material and space requirements for the dissipator. The fitting of the cases onto the mounting
30 plane of the sole plate further presupposes additional drilling and threading of the sole plate. It ensues from all this that the machining and mounting operations required to manufacture the known device are difficult and costly.

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In particular, the object of the invention is to simplify the process of manufacturing a mounting and cooling device for power electronics cases in an envelope.

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A further object is to reduce the height of such a device.

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According to the invention, in a device of the type described:

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- plural through passages are provided in the sole plate of the dissipator,
- pins are interdependent with the base of the envelope, these pins being fitted with threaded holes coaxial with the passages provided in the dissipator,
- bolts for tightening the cases to the dissipator are freely engaged in the passages of the dissipator and are screwed into the threaded holes of the pins to simultaneously secure the cases to the dissipator and the dissipator to the base of the envelope.

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It results therefrom that, on the one hand, the sole plate of the dissipator can be of reduced height, as it no longer needs to house screws parallel to the mounting plane of the cases, and on the other hand, that the manufacture of the device is facilitated. This invention is defined in claim 1. A device in accordance with the preamble of claim 1 is known from US patent application No. 3,462,553.

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The passages provided in the sole plate of the dissipator are, preferably, provided facing positioning fins of width greater than that of the neighbouring dissipation fins and comprise a through part bored in

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these fins and serving notably to position the dissipator in relation to the pins. It is advantageous that the pins cooperate by nesting into positioning fins, in particular when the pins are cylindrical and housed in scallopings of cylindrical surface opened laterally from the positioning ribs.

Further features and advantages of the invention will be apparent from the reading of a sample embodiment, provided by way of a non-limiting example, in reference to the appended drawings.

Figure 1 schematically shows a partial section of a device according to the invention;

Figure 2 represents, on a larger scale, a partial sectional view of the dissipator;

Figure 3 is a partial section of the dissipator along plane III-III indicated in figure 4;

Figures 4 and 5 are partial sectional views along planes IV-IV and V-V in figure 3.

The mounting and cooling device 10 for power electronics cases illustrated in figure 1 comprises a heat dissipator 11 to which are attached power electronics cases 12 and which is itself fixed to an envelope 13 such as a box or body of an electrical apparatus.

The heat dissipator 11 is an extruded body in aluminium alloy. It comprises a sole plate 14 of reduced

thickness and fins 15 oriented in a substantially perpendicular manner to the sole plate and determining a space which is ventilated by a means that is not represented. The sole plate 14 defines a fitting and mounting plane P-P' for the cases 12, the latter being
5 e.g. constituted by power semiconductor modules.

The envelope 13 is in sheet steel; it comprises a base 16 and lateral walls 17 and houses an electronics
10 arrangement of which the power cases 12 are part.

The securing of each case onto the dissipator is performed by means of bolts 18 (see figures 4 and 5) of which the heads 18a rest on a shoulder 19 of the case
15 and of which the threaded rods 18b cooperate with threaded pins 20 interdependent with the base 16 of the envelope 13. The pins 20 are in this instance small cylindrical columns fitted with threaded holes 20a and welded to the base 16 of the envelope. The pins can be
20 attached in any other way to the base 16; they can also comprise a confined nut system associated with the base 16. It can be observed that the dissipator is resting on the base 16 of the envelope and that the tightening of the bolts ensures both the securing of the cases to
25 the dissipator and the securing of the latter to the envelope.

The bolts 18 pass through orifices provided in the cases and through through passages 21 bored in the
30 dissipator. Figures 4 and 5 show, in partial section, the zones of the pins 20 and passages 21. These passages comprise a part 21a bored in the sole plate 14 and extended by a part 21b bored in the positioning fins 22. The latter are larger and therefore more
35 massive than the neighbouring dissipation fins in order

to avoid being damaged during boring. The diameter of the passages 21 is preferentially greater than the width of the positioning fins in order to create, in the latter, scallopings 23 of cylindrical surface, opened laterally, ensuring, by way of nesting of the small columns in these scallopings, a positioning of the dissipator in relation to the envelope (see figures 3 to 5).

In another less satisfactory embodiment from the thermal and mechanical point of view, the small threaded columns 20 can rise from the base 16 of the envelope 13 to the region of the sole plate 14, the fin 22 then being suppressed. The positioning fins 22 can furthermore be of smaller height than the dissipation fins 15. They are in all cases considerably less in number than the fins 15.

It goes without saying that the pins 20 and the passages 21 can be disposed at regular or irregular intervals corresponding to various types of power semiconductor modules susceptible of being mounted.

**CLAIMS:**

1. Mounting and cooling device (10) for power electronics cases (12) in an envelope (13) which houses an electronics arrangement, the device comprising a heat dissipator (11) which is secured to the envelope and comprises, on the one hand, a sole plate (14) defining a mounting plane for the cases, and, on the other hand, fins (15) oriented perpendicularly to the mounting plane, the power cases being secured to the dissipator by means of bolts (18), plural through passages (21) being provided in the sole plate (14) of the dissipator (11),

characterized by the fact that:

- pins (20) interdependent with the base (16) of the envelope (13) are fitted with threaded holes (20a) coaxial with the passages (21),

- the bolts (18) for tightening the cases to the dissipator are freely engaged in the passages of the dissipator and are screwed into the threaded holes of the pins to simultaneously secure the cases to the dissipator and the latter to the base of the envelope.

2. Device according to claim 1, characterized by the fact that the dissipator (11) comprises positioning fins (22) larger than the neighbouring dissipation fins (15) and that the passages (21) comprise a through part (21b) bored in the positioning fins.

3. Device according to claim 2, characterized by the fact that the dissipator is extruded in light alloy and that the pins (20) cooperate by nesting with the positioning fins (22).



4. Device according to claim 3,
characterized by the fact that the pins (20) are
cylindrical and are nested into scallopings (23) of
5 cylindrical surface created in the positioning fins
(22) by the boring of the parts (21b) of the passages
(21) in said ribs.