COMPRESSION CONNECTOR

FIELD OF INVENTION

The present invention relates broadly to a compression connector.

BACKGROUND

Typically, solder tails of compression connectors mounted on printed circuit boards (PCB) are subjected to stress during interconnection. The stress can cause the solder tails to detach from the main PCB and thus, breaking the electrical connection between the connector and the PCB.

Therefore, it is desired to design the terminal and the housing of the connector such that stress may not be transferred to the solder tails during interconnection of compression connectors.

SUMMARY

In accordance with a first aspect of the present invention, there is provided a compression connector comprising: a housing; at least one terminal element disposed in the housing; each terminal element comprising a resilient contact portion, a resilient solder tail portion, and a mid portion between the contact and the solder tail portions, the contact and the solder tail portions being disposed at opposing longitudinal ends of the mid portion and the mid portion being fixed with respect to the housing against movement under a compressive load being applied to the contact portion, the solder tail portion, or both.

The solder tail portion may extend substantially parallel underneath the mid portion.

The solder tail portion may comprise two sections and a kink therebetween, the two sections being substantially parallel to the mid portion.

The kink may be in a direction away from the mid portion towards a free solder end of the solder tail portion.

The compression connector may have at least part of the mid portion being received in a slot formed in the housing.

The compression connector may have at least part of the mid portion being seated on a seat portion of the housing.

The seat portion may be disposed adjacent the slot.

The solder tail portion may extend underneath the seat portion of the housing.

The solder tail portion may be separated by a gap from the seat portion along a length of the solder tail portion.

The housing may have a cavity extending from a bottom edge of the housing to a lower surface of the seat portion for accommodating the solder tail portion.

The contact portion of the terminal element may be connected to the mid portion via a first curved portion for providing the resilience.

The contact portion may comprise a first section connected to the first curved portion and being substantially parallel to the mid portion, and a substantially U-shaped second section extending beyond the housing.

The legs of the U-shaped second section may be substantially perpendicular to the first section of the contact portion.

The solder tail portion of the terminal element may be connected to the mid section via a second curved portion for providing the resilience.

A plurality of terminal elements may be arranged side by side in the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

Figure 1a is a side view drawing of a terminal in an example embodiment.

Figure 1b is a top view drawing, partly in section, of a mid portion of the terminal of Figure 1a.

Figure 2a is a cross-sectional drawing of a housing in an example embodiment.

Figures 2b and 2c perspective drawings of a front an a back view respectively of the housing wherein a plurality of terminals are arranged side by side in an example embodiment.

Figure 3 is a cross-sectional drawing of a compression connector in an example embodiment.

DETAILED DESCRIPTION

Figure 1 illustrates a terminal 100 of a compression connector in an example embodiment. The terminal 100 comprises of a contact portion 102, a mid portion 104 and a solder tail portion 106. The contact portion 102 and the solder tail portion 106 are connected at opposite ends of the mid portion 104. The terminal 100 is made from a conductive material in the example embodiment, e.g. beryllium copper or phosphor bronze, and/or gold plated material. Other conductive materials may be used for manufacturing the terminal in different embodiments.

In the example embodiment, one end of the mid portion 104 comprises an extension section 105 and a connection to a first curved portion 120, arranged side by side along a width of the mid portion 104. As can be better seen in Figure 1b, which shows a top view of the mid portion 104, partly in section, the extension section 105 extends along the length of a main body 107 of the mid portion 104. The main body 107 and the extension section 105 are substantially horizontal in the example embodiment.

The contact portion 102 comprises a substantially horizontal section 108 and a substantially U-shaped section 110 in the example embodiment. The horizontal section 108 connects the contact portion 102 and the mid portion 104 via a second curved portion 112. The horizontal section 108 is substantially parallel to the mid portion 104 and substantially perpendicular to the legs of the U-shaped section 110.

The solder tail portion 106 comprises a kink 114 between a first and a second section 116 and 118 in the example embodiment. The kink 114 moves away from the first section 116 towards the second section 118. The first section 116 has a shorter gap from the mid portion 104 compared to the second section 118. The first and second sections 116 and 118 are substantially parallel to the mid portion 104.

The first section 116 connects the solder tail portion 106 and the mid portion 104 via the first curved portion 120 in the example embodiment. The solder tail portion 106 extends substantially parallel underneath the mid portion 104.

The terminal 100 is designed such that it can be received in a housing of the compression connector. Details of the assembling of the terminal 100 and the housing are described in the following for the example embodiment.

Figure 2a is a cross-sectional drawing of a moulded housing 200 in the example embodiment. The housing 200 is made of generic engineering plastics, e.g. Polyphenylene Sulfide (PPS) and Liquid Crystal Polymer (LCP) in the example mebodiment. Other non-conductive materials, techniques other than moulding, or both may be used for manufacturing the housing in different embodiments. The housing 200

comprises a seat portion 202 and a cavity 206 in the example embodiment. The seat portion 202 is substantially horizontal and substantially perpendicular to a sidewall 203 of the housing 200. The cavity 206 is divided into an upper cavity section 208 and a lower cavity section 210 by the seat portion 202 in the example embodiment. The lower cavity section 210 extends from a bottom edge 212 of the housing 200 to a lower surface 214 of the seat portion 202.

Figures 2b and 2c are perspective drawings of a front an a back view respectively of the housing 200 wherein a plurality of terminals 100 are arranged side by side in the example embodiment. It can be seen that the housing 200 further comprises a circular via 218 at the centre of its top surface in the example embodiment. The circular via 218 is utilised in mounting the housing 200 on a PCB (not shown).

With reference to Figure 2b, the housing 200 comprises a slot 204 formed in a side wall 209 adjacent the seat portion 202 (Figure 2a). The slot 204 receives the extension section 105 of the mid portion 104 when the terminal 100 is inserted into the housing 200. As will be appreciated by a person skilled in the art, the mid portion 104 of the terminal 100 is thus substantially fixed against movement inside the housing 200 under compression of the contact portion 102, the solder tail 106 (Figure 2c), or both.

Figure 3 is a cross-sectional drawing of a assembled compression connector 300 in the example embodiment. The terminal 100 is inserted into the housing 200 in the direction of arrow 302. The solder tail portion 106 of the terminal 100 extends substantially parallel underneath the seat portion 202. The first and second sections 116 and 118 of the solder tail portion 106 are substantially parallel to the seat portion 202. The solder tail portion 106 is separated from the seat portion 202 by a gap 304 wherein the first section 116 has a shorter distance from the seat portion 202 compared to the second section 118.

The lower cavity section 210 allows the solder tail portion 106 to be located substantially within the housing 200 in the example embodiment. This can save space on the motherboard on which the connector 300 is placed. While the second

section 118 of the solder tail portion 106 extends marginally beyond the housing 200, it will be appreciated that the lower cavity 210 enables formation of a solder bond to the PCB (not shown) close to or substantially within the housing 200.

The U-shaped portion 110 of the contact portion 102 of the terminal 100 extends beyond the housing 200 in the example embodiment. Load is applied to the contact portion 102 by pressing e.g. another PCB (not shown) vertically onto the U-shaped portion 110 during interconnection. The second curved portion 112 provides the contact portion 102 with resilience when the load is applied to the contact portion 102. Similarly, the first curved section 120 provides the solder tail portion 106 with resilience when a load is applied to the solder tail portion 106 in the example embodiment.

Because the mid portion 104 of the terminal 100 is substantially fixed against movement inside the housing 200 under compressive load being applied to the contact portion 102, the solder tail portion 106, or both, no or minimal transfer of stress to respective other parts of the terminal 100 will occur under the compressive load in the example embodiment.

As mentioned above, the contact portion 102 is connected to the mid portion 104 via the second curved portion 112 at an opposite end of the mid portion 104 than the solder tail portion 106 in the example embodiment. This enables the terminal 100 to be inserted into the housing 200 with a housing design in which the cavity 206 is partially roofed (see roof portion 306) without having to compress the contact portion 102, while providing increased resilience compared with a design in which the second curved portion 112 and thus the contact portion 102 are connected at the same end of the mid portion 104 as the solder tail portion 106.

It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

For example, the number of terminals that can be arranged in a housing may vary for different embodiments. The shape of the terminals and housings is not limited as shown in the example embodiments. The positions of the slot and the seat portion may vary in different embodiments.

CLAIMS

1. A compression connector comprising:

a housing;

at least one terminal element disposed in the housing;

each terminal element comprising a resilient contact portion, a resilient solder tail portion, and a mid portion between the contact and the solder tail portions, the contact and the solder tail portions being disposed at opposing longitudinal ends of the mid portion and the mid portion being fixed with respect to the housing against movement under a compressive load being applied to the contact portion, the solder tail portion, or both.

2. The compression connector as claimed in claim 1, wherein the solder tail portion extends substantially parallel underneath the mid portion.

3. The compression connector as claimed in claim 2, wherein the solder tail portion comprises two sections and a kink therebetween, the two sections being substantially parallel to the mid portion.

4. The compression connector as claimed in claim 3, wherein the kink is in a direction away from the mid portion towards a free solder end of the solder tail portion.

5. The compression connector as claimed in any one of the preceding claims, wherein at least part of the mid portion is received in a slot formed in the housing.

6. The compression connector as claimed in claim 5, wherein at least part of the mid portion is seated on a seat portion of the housing.

7. The compression connector as claimed in claim 6, wherein the seat portion is disposed adjacent the slot.

8. The compression connector as claimed in claims 6 or 7, wherein the solder tail portion extends underneath the seat portion of the housing.

9. The compression connector as claimed in claim 8, wherein the solder tail portion is separated by a gap from the seat portion along a length of the solder tail portion.

10. The compression connector as claimed in any one of claims 6 to 9, wherein the housing has a cavity extending from a bottom edge of the housing to a lower surface of the seat portion for accommodating the solder tail portion.

11. The compression connector as claimed in any of claims 1 to 10, wherein the contact portion of the terminal element is connected to the mid portion via a first curved portion for providing the resilience.

12. The compression connector as claimed in claim 11, wherein the contact portion comprises a first section connected to the first curved portion and being substantially parallel to the mid portion, and a substantially U-shaped second section extending beyond the housing.

13. The compression connector as claimed in claim 12, wherein the legs of the U-shaped second section are substantially perpendicular to the first section of the contact portion.

14. The compression connector as claimed in any of claims 1 to 13, wherein the solder tail portion of the terminal element is connected to the mid section via a second curved portion for providing the resilience.

15. The compression connector as claimed in any of claims 1 to 14, wherein a plurality of terminal elements are arranged side by side in the housing.