

PATENT SPECIFICATION

(11)

1 488 328

1 488 328

- (21) Application No. 20796/76 (22) Filed 20 May 1976
(31) Convention Application No. 582 315 (32) Filed 30 May 1975 in
(33) United States of America (US)
(34) Complete Specification published 12 Oct. 1977
(1) INT. CL.³ H01R 13/24
(2) Index at acceptance
H2E 3A13 3A2 3A6H 3A6J 3C11 3C2C 3D10 3E27 3E6 9X
(72) Inventors WILLIAM SAMUEL SCHEINGOLD
FRANK CHRISTIAN YOUNGFLEISH



(54) ELECTRICAL CONNECTOR

(71) We, AMP INCORPORATED, a corporation organised and existing under the laws of the State of New Jersey, United States of America, of Eisenhower Boulevard, 5 Harrisburg, Pennsylvania, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an electrical connector, and particularly to an electrical connector for use in mounting a leadless integrated circuit package on a printed circuit board.

Many forms of such connectors are known, but known connectors suffer from the disadvantage that they do not adequately meet the conflicting requirements of providing a low assembly force thereby to avoid damaging of the package, connector, or board, while providing a satisfactorily high contact force between the package and the connector, and between the connector and the board.

According to this invention there is provided an electrical connector for use in mounting a leadless integrated circuit package on a printed circuit board, comprising a body of electrically insulating material carrying two rows of electrical terminals each providing a first contact point for contacting a contact on an integrated circuit package, and a second contact point for contacting a conductor on a printed circuit board, in which each terminal comprises first and second integrally formed beam members joined by a U-shaped bight, the first contact point being on the outer surface of the first beam member, the second contact point being on the outer surface of the second beam member, and the free end of the second beam member being secured to the body of the connector.

An electrical connector according to this

invention will now be described by way of example with reference to the drawing, in which:—

Figure 1 is a perspective view of the connector; and

Figure 2 is a cross-section through part of the connector.

The connector to be described is for use in mounting a leadless integrated circuit package 1 on a printed circuit board 2, the package 1 having contacts 3 which are to be connected to conductors 4 on the board 2 by the connector.

The connector comprises a body 5 moulded in one-piece from electrically insulating material such as glass filled phenylene oxide, and having end walls 6 and side walls 7 which together define an area to receive the package 1. The upper (as seen in the drawing) inner edges of the side walls 7 and bevelled as shown at 8 to guide a package 1 onto the body 5 as required.

Beneath the package receiving area is a base 9 which is stepped to provide a rectangular ledge 10 on which the package 1 rests as shown in Figure 2;

The base 9 also contains two rows of through cavities 11, the rows extending parallel to the side walls 7.

Each cavity 11 contains an electrical terminal 12 formed of metal such as beryllium copper and which has a first contact point 13 for contacting a contact 3 on the package 1, and a second contact point 14 for contacting a conductor 4 on the printed circuit board 2. The terminal 12 comprises first and second integrally formed beam members 15 and 16 joined by a U-shaped bight 17, the first contact point 13 being on the outer surface of the first beam member 15, and the second contact point 14 being on the outer surface of the second beam member 16.

A free end portion of the second beam member 16 is bent into a substantially U-

shape 18 with the arms of the U-shape 18 extending transversely of the remainder of the second beam member 16, the U-shaped portion 18 being received in a recess 19 in a side wall 7 of the body 5 and being secured therein by means of a lance 20 struck from the outer arm of the U-shaped portion 18 and engaging in a hole 21 in the side wall 7, which hole 21 is accessible from the outside of the connector for release of the lance 20 by means of a suitable tool. Each terminal 12 is thus releasably secured to the body 5 of the connector in the required position.

The base of the recess 19 containing the U-shaped portion 18 of the second beam member 16 has a hole 22 therein accessible to the outside of the connector for insertion of a test probe to contact the terminal 12. The outer surface of each side wall 7 is recessed to provide access to the test probe holes 22.

A free end portion 23 of the first beam member 15 is bent to extend away from the second beam member 16, the bend providing a smooth rounded surface 24 for engagement with the inner surface of the side wall 7 thereby to restrict movement of the free end of the first beam member 15 to directions transverse of the second beam member 16.

The free end portion 23 of the first beam member 15 is received when the connector is not in use, and as shown in dashed line in Figure 2, in a recess 25 in the wall 7 thereby to restrain the free end portion 23 against movement away from the second beam member 16.

As clearly shown in Figure 2, the first beam member 15 is bent twice to provide a step shape extending away from the second beam member 16, the first contact point 13 being on the portion of the step adjacent the free end portion 23 of the first beam member.

As shown in Figure 2, the second contact point 14 is carried on an outwardly directed kink 26 in the second beam member 16, which kink 26 passes about a bar 27 formed integrally with the body 5 and extending the length thereof. The bar 27 serves to limit deflection of the second beam member 16 towards the first beam member 15.

The contact points 13 and 14 may be simple dimples formed in the beam members 15 and 16, or otherwise may be deposits of conductive material, such as tin, on the beam members 15 and 16 at the appropriate points.

The base 9 of the body 5 contains a central recess 28 having a hole 29 at the centre thereof and extending through the base 9. For mounting the connector on the printed circuit board 2, the recess 28 receives a metal block 29 having a screw-threaded

hole therein in alignment with the hole 28 in the base 9, and a bolt 30 is passed through a hole in the board 2, and through the hole 28 in the base 9 to engage in the hole in the block 29 thereby to clamp the body 5 of the connector to the board with the second contact points 14 of terminals 12 of the connector in engagement with conductors 4 on the board 2, as shown in Figure 2.

Each end wall 6 of the body 5 of the connector carries an integrally formed upstanding boss 31 which in turn carries a post 32 having an enlarged vertically split head 33.

The package 1 is located on the connector by passing the heads 33 through holes in the package 1, the halves of the heads 33 being resiliently urged together during this action, until the package 1 comes to rest on the ledge 10 of the body 5 of the connector (as shown in Figure 2), when the heads 33 will have passed through the holes in the package 1 and will have opened out again to retain the package 1 on the body 5 of the connector, as shown in Figure 2, with the first contact points 13 of the terminals 12 in contact with contacts 3 on the package 1. The package 1 is then clamped to the connector by means of a 95 clamp (not shown).

As illustrated by Figure 2, the shape of the terminals 12 and the manner in which they co-operate with the body 5 of the connector provide a multidirectional wiping action between the first contact points 13 of the terminals 12 and the contacts 3 of the package 1.

As the package 1 is pressed down over the posts 31 the terminals 12 are distorted from their non-loaded position shown in dashed line in Figure 2, to their loaded position shown in solid line in Figure 2. The first contact point 13 of each terminal 12 is moved both downwardly and rotationally as can be seen from the change in angle to the horizontal between the dashed line position and the solid line position of the portion of the first beam member 15 carrying the first contact point 13, this resulting in the wiping action between each first contact point 13 and the associated contact 3 on the package 1.

WHAT WE CLAIM IS:—

1. An electrical connector for use in mounting a leadless integrated circuit package on a printed circuit board, comprising a body of electrically insulating material carrying two rows of electrical terminals each providing a first contact point for contacting a contact on an integrated circuit package, and a second contact point for contacting a conductor on a printed circuit board, in which each terminal comprises first and second integrally formed beam

shape 18 with the arms of the U-shape 18 extending transversely of the remainder of the second beam member 16, the U-shaped portion 18 being received in a recess 19 in a side wall 7 of the body 5 and being secured therein by means of a lance 20 struck from the outer arm of the U-shaped portion 18 and engaging in a hole 21 in the side wall 7, which hole 21 is accessible from the outside of the connector for release of the lance 20 by means of a suitable tool. Each terminal 12 is thus releasably secured to the body 5 of the connector in the required position.

The base of the recess 19 containing the U-shaped portion 18 of the second beam member 16 has a hole 22 therein accessible to the outside of the connector for insertion of a test probe to contact the terminal 12. The outer surface of each side wall 7 is recessed to provide access to the test probe holes 22.

A free end portion 23 of the first beam member 15 is bent to extend away from the second beam member 16, the bend providing a smooth rounded surface 24 for engagement with the inner surface of the side wall 7 thereby to restrict movement of the free end of the first beam member 15 to directions transverse of the second beam member 16.

The free end portion 23 of the first beam member 15 is received when the connector is not in use, and as shown in dashed line in Figure 2, in a recess 25 in the wall 7 thereby to restrain the free end portion 23 against movement away from the second beam member 16.

As clearly shown in Figure 2, the first beam member 15 is bent twice to provide a step shape extending away from the second beam member 16, the first contact point 13 being on the portion of the step adjacent the free end portion 23 of the first beam member.

As shown in Figure 2, the second contact point 14 is carried on an outwardly directed kink 26 in the second beam member 16, which kink 26 passes about a bar 27 formed integrally with the body 5 and extending the length thereof. The bar 27 serves to limit deflection of the second beam member 16 towards the first beam member 15.

The contact points 13 and 14 may be simple dimples formed in the beam members 15 and 16, or otherwise may be deposits of conductive material, such as tin, on the beam members 15 and 16 at the appropriate points.

The base 9 of the body 5 contains a central recess 28 having a hole 29 at the centre thereof and extending through the base 9. For mounting the connector on the printed circuit board 2, the recess 28 receives a metal block 29 having a screw-threaded

hole therein in alignment with the hole 28 in the base 9, and a bolt 30 is passed through a hole in the board 2, and through the hole 28 in the base 9 to engage in the hole in the block 29 thereby to clamp the body 5 of the connector to the board with the second contact points 14 of terminals 12 of the connector in engagement with conductors 4 on the board 2, as shown in Figure 2.

Each end wall 6 of the body 5 of the connector carries an integrally formed up-standing boss 31 which in turn carries a post 32 having an enlarged vertically split head 33.

The package 1 is located on the connector by passing the heads 33 through holes in the package 1, the halves of the heads 33 being resiliently urged together during this action, until the package 1 comes to rest on the ledge 10 of the body 5 of the connector (as shown in Figure 2), when the heads 33 will have passed through the holes in the package 1 and will have opened out again to retain the package 1 on the body 5 of the connector, as shown in Figure 2, with the first contact points 13 of the terminals 12 in contact with contacts 3 on the package 1. The package 1 is then clamped to the connector by means of a clamp (not shown).

As illustrated by Figure 2, the shape of the terminals 12 and the manner in which they co-operate with the body 5 of the connector provide a multidirectional wiping action between the first contact points 13 of the terminals 12 and the contacts 3 of the package 1.

As the package 1 is pressed down over the posts 31 the terminals 12 are distorted from their non-loaded position shown in dashed line in Figure 2, to their loaded position shown in solid line in Figure 2. The first contact point 13 of each terminal 12 is moved both downwardly and rotationally as can be seen from the change in angle to the horizontal between the dashed line position and the solid line position of the portion of the first beam member 15 carrying the first contact point 13, this resulting in the wiping action between each first contact point 13 and the associated contact 3 on the package 1.

WHAT WE CLAIM IS:—

1. An electrical connector for use in mounting a leadless integrated circuit package on a printed circuit board, comprising a body of electrically insulating material carrying two rows of electrical terminals each providing a first contact point for contacting a contact on an integrated circuit package, and a second contact point for contacting a conductor on a printed circuit board, in which each terminal comprises first and second integrally formed beam





* C L M S *

1 488 328

3

12

members joined by a U-shaped bight, the first contact point being on the outer surface of the first beam member, the second contact point being on the outer surface of the second beam member, and the free end of the second beam member being secured to the body of the connector.

2. A connector as claimed in Claim 1, in which the free end of the first beam member engages a wall of the body of the connector thereby to restrict movement of the free end of the first beam member to directions transverse of the second beam member.

3. A connector as claimed in Claim 2, in which a free end portion of the first beam member is bent to extend away from the second beam member with the bend providing a smooth rounded surface for engagement with said wall of the body of the connector, the free end portion being received, when the connector is not in use, in a recess in said wall of the body of the connector thereby to restrain the free end portion against movement away from the second beam member.

4. A connector as claimed in Claim 1, Claim 2, or Claim 3, in which the first beam member is bent twice to provide a step shape extending away from the second beam member, the first contact point being on a portion of the step adjacent the free end of the first beam member.

5. A connector as claimed in any preceding claim, in which a free end portion of the second beam member is bent into a substantially U-shape with the arms of the U-shape extending transversely of the

remainder of the second beam member, the substantially U-shaped free end portion of the second beam member being received in a recess in the body of the connector and being secured therein by means of a lance struck from the outer arm of the U-shape and engaging in a hole in the body of the connector, which hole is accessible from the outside of the connector for release of the lance.

6. A connector as claimed in Claim 5, in which the base of the recess containing the substantially U-shaped free end portion of the second beam member has a hole therein accessible to the outside of the connector for insertion of a test probe to contact the terminal.

7. A connector as claimed in any preceding claim, in which the second contact point is on an outwardly directed kink in the second beam member, which kink passes about a bar formed integrally with the body of the connector and extending the length thereof.

8. A connector as claimed in any preceding claim, in which the body carries two integrally formed upstanding bosses each of which in turn carries a post having an enlarged vertically split head adapted to be passed through a hole in the package in a compressed state and thereafter open out to retain the package on the connector.

9. An electrical connector substantially as hereinbefore described with reference to the drawing.

For the Applicants:
R. G. STUART-PRINCE,
Chartered Patent Agent.