

Description

This invention relates, generally, to a chip carrier socket and contact and, more particularly, to a chip carrier socket which provides an extremely short contact length while providing extremely high contact mating forces.

Chip carrier sockets are well known, see for example US-A-4331373 and US-A-4322119.

Attendant with higher density and higher speed chip carriers is the need to keep contact lengths short so as to minimize capacitive, inductive and resistive effects which may introduce errors into the system. Heretofore, however, most schemes which attempt to utilize short circuit paths have overall contact lengths which do introduce some adverse effects but which are generally necessary so as to obtain proper member lengths for force or moment arm purposes. Examples of these types of contacts may be found in United States Patents Nos. 4,349,238, 4,341,433 and 4,334,727.

It would be advantageous to have a device which accomplishes extremely short contact or circuit path lengths while not having an overall contact length which is considerably longer than the circuit path.

It would also be advantageous to have a device which provides sufficiently high contact mating forces such that tin or another non-precious metal may be utilized on the surface of the contact.

Also advantageous would be a device which is relatively inexpensive as well as easy to manufacture. Such a device is taught by the present invention.

Accordingly, the present invention consists in a chip carrier socket comprising a chip carrier having conductive leads, a base plate profiled to receive a chip carrier and having contacts extending through the base plate and disposed adjacent the conductive leads for electrical contact therewith, and a retainer profiled to be placed over the chip carrier and base plate and fastened to the base plate, characterized in that the retainer has a cavity therein and a plurality of flexible arms or fingers in engagement with the conductive leads, and a spring carrier is disposed in said cavity for resiliently urging the flexible arms or fingers inwardly towards the conductive leads so as to cause contacting mating force between the conductive leads and the contacts.

Reference is now made to the accompanying drawings in which:

Figure 1 is an exploded isometric drawing of the chip carrier and socket of the present invention in conjunction with a circuit board;

Figure 2 is a cross-sectional view taken through a portion of the assembled device of Figure 1; and

Figure 3 is a cut-out isometric view showing with more detail the contact arrangement of the present invention and the associated components.

Referring now to Figure 1, there is illustrated an exploded isometric view of the present invention. Shown is a printed circuit board 10 having disposed thereon a base plate shown generally at 12.

A chip carrier 14 is disposed between the base plate 12 and a retainer shown generally at 16. The base plate 12 is comprised of a frame 18 having contacts 20 disposed therein with contact stops 22 disposed adjacent the contacts 20 and around the aperture 24 which is disposed in the center of the frame 18. Latching members 26 are disposed at each corner of the frame 18 so as to be engageable with corresponding recesses 32 which are contained in the retainer 16. The chip carrier 14 is comprised of a ceramic portion 28 having chip carrier conductive leads 30 around the periphery thereof. The retainer 16 has flexible arms or fingers 34 having spaces 35 disposed therebetween thereby allowing independent movement amongst the fingers 34. The fingers 34 also provide suitable contact mating force between the chip carrier conductive leads 30 and the contacts 20 (as shown more clearly in Figures 2 and 3). The base plate 12 and the retainer 16 in the preferred embodiment of the present invention are comprised of plastic which has been injection molded, although other materials and methods can and may be utilized. During assembly of the apparatus, the chip carrier 14 is placed onto the frame 18 with the retainer 16 thereafter placed over the chip carrier 14 with the recesses 32 contained in the retainer 16 positioned so as to engage the housing latching members 26 contained on the frame 18. Therefore, when the retainer 16 is pressed downward onto the frame 18, the latches 26 engage the recesses 32 thereby relatively fixedly securing the chip carrier 14 between the retainer 16 and the frame 18. This also causes a contact wiping action between the contacts 20 and the conductive leads 30 (as shown more clearly in Figure 2).

Referring now to Figure 2, there is illustrated via a cross-sectional view, the contact mating aspects of the present invention. The circuit board 10 has conductive strips 36 thereon although it is to be understood that other types of circuit boards can be utilized such as screen printed. Plated through holes are used in the circuit board 10 which engage the stem 46 of the contacts 20. A tab 41 contained on alternating contacts 20 maintains the contact 20 in the frame 18. The frame 18 has frame recesses 45 which provide space for the lower portion of the conductive leads 30. Disposed in the retainer 16 is a spring carrier piece 42. The spring carrier piece 42 has a spring carrier retaining tab 48 which is used to hold the carrier piece 42 firmly in the retainer 16 (as shown more clearly in Figure 3). The spring carrier piece 42 is preferably comprised of beryllium copper for its spring properties, although it is to be understood that other materials can be utilized, such as steel or plastic. The spring carrier 42 is formed into a closed loop type of structure with a slot 50 cooperating with a spring carrier tab 56 thereby maintaining the carrier 42 in a preloaded condition. The knee portion 54 of the spring carrier 42 cooperates with the flexible arm 34 and urges the flexible arm force exertion point shown generally at 37 to be urged with significantly high contact

mating towards the conductive lead 30. This then causes the conductive lead 30 to be forced against the contact mating area shown generally at 44 of the contact 20. Therefore, this provides electrical communication from the conductive lead 30, directly to the contact 20, and thereafter to the conductive strip 36 contained on the circuit board 10. It has been found that this provides an extremely short contact length which greatly diminishes any inductive, capacitive or resistive effects. Further, the action of the knee 54 in cooperation with the flexible arm exertion point 37 utilizes a force in an almost normal direction between the conductive lead 30 and the contact 20. Therefore, the force requirements of the spring carrier piece 42 are kept to a minimum since almost all the force produced by the carrier piece 42 is used to producing the contact mating force thereby allowing the size of the carrier piece 42 to be kept to the minimum as well as allowing the conductive lead 30 and the contact 20 to be plated with preferably tin or any other non-precious conductive metal (although gold may be utilized). Further, during attachment of the retainer 16 to the base plate 12, a ledge shown generally at 40 contained on the flexible arm 34 in conjunction with hold down portion shown generally at 38 of the flexible arm 34 guides and pushes the conductive lead 30 downward and into place with a contact wiping motion occurring between the conductive lead 30 and the contact mating area shown generally at 44 of the contact 20 thereby removing any oxides or foreign matter which may be present.

Referring now to Figure 3, there is illustrated an isometric cross-sectional view showing in greater detail the contact arrangement of the present invention. The contacts used in the present invention utilize two different configurations so as to allow staggering and, therefore, higher center-to-center spacing, although the contact mating area 44 and stem portion 46 are similar and perform the same function. The positioning of the contact 20 in the frame 18 requires that a straight or non-bent contact mating area 44 of the contact 20 be pushed up through the bottom of the frame 18 through contact positioning slots 53 contained therein. As can also be seen every other contact has a contact base portion 51 having a contact tab 55 at the end thereof. The contact tab 55 fits into the contact alignment aperture 47 contained in the frame 18. Upon insertion of all the contacts 20 into the frame 18, the entire frame 18 is placed into a press (not shown but which is readily within the scope of knowledge for someone similarly skilled in the art) which bends the contact mating area 44 of the contact 20 into the position shown, the contact stop 22 providing a type of form as well as being used as a contact stop for contact mating purposes as shown more clearly in Figure 2. The spring carrier piece 42 which is disposed in the cavity 57 of the retainer 16 is comprised of a singular contiguous piece, although shorter or discrete portions may be utilized. As mentioned previously, spaces 52 separate spring carrier

fingers 58 from each other thereby providing individualized force components for each contact 20 associated with it. The spring carrier 42 is placed into the cavity 57 in a preloaded condition with the slot 50 and spring carrier tab 56 allowing the spring carrier finger 58 to be flexed or moved in conjunction with assembly of the present device.

It is to be remembered that many variations of the present invention may be practiced. For example, the shape of the spring carrier may be of a different shape such as a triangle or the like while the latching mechanism between the base plate and the frame may be eliminated or other fastening means such as screws may be used. Further, different types of contact alignment apertures such as a groove or recess may be used or they may be eliminated entirely while a different manner of aligning the contacts themselves such as slots can be utilized. Also, the contacts could be placed into a slightly different frame thereby allowing the contacts to be placed into the frame in a pre-bent configuration or could be integrally molded with plastic as part of the frame. Also, different methods of staggering contact stems could be used.

Accordingly, the disclosed invention produces a device for a chip carrier socket and contact which is extremely simple and inexpensive to manufacture and use while providing very high contact mating forces such that non-precious metals may be used as a plating on the contacts if desired. Further, the present invention provides a scheme which utilizes an extremely short contact path length with the result that inductance, capacitive and resistive impedances are minimized.

Claims

1. A chip carrier socket comprising a chip carrier (14) having conductive leads (30), a base plate (12) profiled to receive the chip carrier and having contacts (20) extending through the base plate and disposed adjacent the conductive leads (30) for electrical contact therewith, and a retainer (16) profiled to be placed over the chip carrier and base plate and fastened to the base plate, characterized in that the retainer has a cavity (57) therein and a plurality of flexible arms or fingers (34) in engagement with the conductive leads (30), and a spring carrier (42) is disposed in said cavity for resiliently urging the flexible arms or fingers inwardly towards the conductive leads so as to cause contacting mating force between the conductive leads and the contacts (20).

2. A chip barrier socket according to claim 1, characterized in that the base plate (12) has a plurality of upstanding latch members (26) engaged with recesses (32) in the retainer (16) for fastening the retainer to the base plate.

3. A chip carrier socket according to claim 1 or 2, characterized in that the contact mating force retains the chip carrier (14) within the chip carrier socket.

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2. A chip carrier socket according to claim 1, characterized in that the base plate (12) has a plurality of upstanding latch members (26) engaged with recesses (32) in the retainer (16) for fastening the retainer to the base plate.

3. A chip carrier socket according to claim 1 or 2, characterized in that the contact mating force retains the chip carrier (14) within the chip carrier socket.





Patentansprüche

Revendications

1. Chipträgerfassung mit einem Chipträger (14), der leitfähige Anschlüsse (30) aufweist, mit einer Basisplatte (12), die ein zur Aufnahme des Chipträgers ausgebildetes Profil sowie Kontakte (20) aufweist, die sich durch die Basisplatte hindurcherstrecken und angrenzend an die leitfähigen Anschlüsse (30) zur Herstellung eines elektrischen Kontakts mit diesen angeordnet sind, und mit einem Festhalteteil (16), das ein zur Platzierung über dem Chipträger und der Basisplatte ausgebildetes Profil aufweist und an der Basisplatte befestigt ist, dadurch gekennzeichnet, daß das Festhalteteil einen darin ausgebildeten Hohlraum (57) sowie eine Mehrzahl flexibler Arme oder Finger (34) aufweist, die mit den leitfähigen Anschlüssen (30) in Eingriff stehen, und daß in dem Hohlraum ein Federträger (42) angeordnet ist zum Drücken der flexiblen Arme oder Finger in federnd nachgiebiger Weise nach innen in Richtung auf die leitfähigen Anschlüsse, um eine kontaktherstellende Verbindungskraft zwischen den leitfähigen Anschlüssen und den Kontakten (20) hervorzurufen.

2. Chipträgerfassung nach Anspruch 1, dadurch gekennzeichnet, daß die Basisplatte (12) eine Mehrzahl hochstehender Verriegelungselemente (26) aufweist, die zur Befestigung des Festhalteteils an der Basisplatte mit Aussparungen (32) in dem Festhalteteil (16) in Eingriff stehen.

3. Chipträgerfassung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Kontaktverbindungskraft den Chipträger (14) in der Chipträgerfassung festhält.

1. Socle à support de puce comprenant un support (14) de puce ayant des sorties conductrices (30), une plaque de base (12) profilée pour recevoir le support de puce et ayant des contacts (20) s'étendant à travers la plaque de base et disposés à proximité immédiate des sorties conductrices (30) pour un contact électrique avec elles, et un organe (16) de retenue profilé pour être placé au-dessus du support de puce et de la plaque de base et fixé à la plaque de base, caractérisé en ce que l'organe de retenue présente une cavité (57) et plusieurs bras ou doigts flexibles (34) qui portent contre les sorties conductrices (30), et un support à ressort (42) est disposé dans ladite cavité pour rappeler élastiquement les bras ou doigts flexibles vers l'intérieur en direction des sorties conductrices afin d'établir une force d'accouplement de mise en contact entre les sorties conductrices et les contacts (20).

2. Socle de support de puce selon la revendication 1, caractérisé en ce que la plaque de base (12) comporte plusieurs éléments de verrouillage (26) qui se dressent et s'engagent dans des évidements (32) situés dans l'organe de retenue (16) pour fixer l'organe de retenue à la plaque de base.

3. Socle de support de puce selon la revendication 1 ou 2, caractérisé en ce que la force d'accouplement de contact retient le support de puce (14) dans le socle de support de puce.