

A PICK-UP DEVICE FOR A PLUG

FIELD OF INVENTION

The present invention relates broadly to a pick-up device for a plug and to an assembly of a pick-up device and a plug.

BACKGROUND

Typically, plug connectors such as S-ATA (serial ATA) plugs and SAS (serial attached SCSI) plugs are soldered onto printed circuit boards (PCBs). In PCB assembly processes, pick-up devices or caps are typically used to position the plug connectors onto the PCBs.

In existing pick-up devices, there is a problem of positioning accuracy caused by relative movement of the plug with respect to the pick-up device during handling.

Although some suggested pick-up devices attempt to address this issue, those pick-up devices are typically designed for specific use with a single plug type only. Thus, different pick-up devices are required for different plug types. As a result, the efficiency of the PCB assembly process will be reduced.

Therefore, there is a need to provide an alternative pick-up device designed to address at least one of the above-mentioned problems.

SUMMARY

In accordance with a first aspect of the present invention, there is provided a pick-up device for a plug, the pick-up device comprising: a main body; a pair of walls extending from the main body for resiliently engaging a portion of the plug therebetween; wherein one of the walls comprises an abutment portion extending substantially transversely to said one wall; and the abutment portion comprises a first abutment

surface for abutment with a surface portion of the plug for effecting movement restraint of the pick-up device in at least one lateral direction when the pick-up device engages the plug.

The abutment portion may be disposed at an end of said one wall.

The pick-up device may further comprise a further wall extending from the main body and having a second abutment surface for abutment with another surface portion of the plug.

The first and second abutment surfaces may be disposed for effecting movement restraint of the pick-up device in two lateral directions when the pick-up device engages the plug.

The abutment portion and the further wall may be disposed such that the first and second abutment surfaces face each other.

The pick-up device may further comprise an intermediate wall extending from the main body and between the abutment portion of said one of the pair of walls and the further wall.

The intermediate wall may be substantially parallel to said one of the pair of walls.

The one of the pair of walls, the further wall and the intermediate wall may be formed integrally on the main body.

The pick-up device may be arranged for use with a SAS plug and a S-ATA plug.

In accordance with a second aspect of the present invention, there is provided an assembly comprising: a pick-up device; a plug; wherein the pick-up device comprises: a main body; a pair of walls extending from the main body for resiliently engaging a portion of the plug therebetween; wherein one of the walls comprises an abutment portion

extending substantially transversely to said one wall; and the abutment portion comprises a first abutment surface for abutment with a surface portion of the plug for effecting movement restraint of the pick-up device in at least one lateral direction when the pick-up device engages the plug.

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 1 shows a schematic perspective view of an SAS plug.

Figure 2 shows a schematic perspective view of an S-ATA plug.

Figures 3a shows a schematic perspective view of an SAS plug and a pick-up device.

Figures 3b shows a schematic perspective view of an S-ATA plug and the pick-up device of Figure 3a.

Figure 4 shows a schematic perspective view of another pick-up device for a plug.

DETAILED DESCRIPTION

Figure 1 shows a schematic perspective view of an SAS plug 102. The SAS plug 102 comprises three sets of terminal arrays. A power array 104 and a signal array 106 are of 1.27mm terminal pitch. The power and the signal arrays 104, 106 are located at respective ends of the SAS plug 102 and at the same side of a central wall 114 of the SAS plug 102.

A further signal array 110 (hidden) is disposed between the power array 104 and the signal array 106. The signal array 110 is located at an opposite side of the central

wall 314 compared to the power and the signal arrays 104, 106. A housing portion 112 protrudes from the central wall 14 between the power array 104 and the signal array 106.

Solder tail portions 116 of the terminals 108 protrude beneath the SAS plug 102 and extend in a direction substantially perpendicular to the central wall 114 of the SAS plug 102. The tail portions 116 are of the surface mount type. It will be appreciated that other solder tail configurations are possible.

Figure 2 shows a schematic perspective view of an S-ATA plug 202. Compared to the SAS plug 102 (Figure 1), the S-ATA plug 202 comprises only two sets of terminal arrays, a power array 204 and a signal array 206 of 1.27mm terminal pitch.

The S-ATA plug 202 comprises extension walls 210, 212 extending substantially perpendicularly to respective central walls 214, 216. The extension walls 210, 212 are arranged such that the extension wall 210 faces the extension wall 212, forming a mirror image of each other.

Solder tail portions 218 of the terminals 208 protrude beneath the S-ATA plug 202 in a direction substantially parallel to the central walls 214, 216. The tail portions 218 are of the through hole type in the example embodiment. It will be appreciated that other tail portion configurations are possible.

It will be appreciated that both the SAS plug 102 and S-ATA plug 202 are designed for soldering onto a printed circuit board (not shown).

The terminals e.g. 108, 208 are made from a copper alloy. Other conductive materials including, but not limited to, phosphor bronze, and/or gold or tin plated materials may be used for the terminals e.g. 108, 208. It will be appreciated by a person skilled in the art that the terminals e.g. 108, 208 can be manufactured using known methods including but not limited to e.g. cutting and press forming.

The SAS plug 102 body and the S-ATA plug 202 body are made of high temperature engineering plastic in the example embodiment. Other non-conductive

materials including, but not limited to, generic engineering plastics, e.g. Liquid Crystal Polymer (LCP), may be used for the SAS plug 102 body and the S-ATA plug 202 body. It will be appreciated by a person skilled in the art that the SAS plug 102 and the S-ATA plug 202 can be manufactured using known methods including but not limited to e.g. casting and molding.

Figure 3a shows a schematic perspective view of the SAS plug 102 and a pick-up device 302. The pick-up device 302 comprises a main body plate 304 and a first wall 306 extending from the plate 304. A second wall 308 is disposed spaced apart from, and along the first wall 306.

The first wall 306 comprises an abutment portion in the form of a wall portion 310 disposed at one end of the first wall 306. The wall portion 310 extends substantially transversely to the first wall 306. The pick-up device 302 further comprises a third wall 312 disposed at one end of the wall portion 310. The third wall 312 is substantially parallel to the first wall 306 and extends away from the first wall 306. The first wall 306 and the third wall 312 are formed integrally on the main body plate 304.

A slanted inner surface 314 extends along the first wall 306 and the third wall 312. The second wall 308 of the pick-up device 302 has an inwardly facing slanted protrusion 316 for facilitating the resilient engagement of the pick-up device 302 and the SAS plug 102.

For pick-up of the SAS plug 102, the pair of the first wall 306 and the second wall 308 of the pick-up device 302 resiliently engage the central wall 114 of the SAS plug 102. At the same time, a surface 318 of the wall portion 310 abuts the housing portion 112 of the SAS plug 102. It will be appreciated by the person skilled in the art that lateral movement between the SAS plug 102 and the pick-up device 302 is restrained in one direction by the abutment of the surface 318 with the housing portion 112 when the pick-up device 302 engages the SAS plug 102. This advantageously facilitates handling and positioning of the SAS plug 102.

The pick-up device 302 is held by a vacuum suction head 319 of a computer-controlled transfer arm 320 at a position for engaging the SAS plug 102 substantially

at a central position with respect to the SAS plug 102. If the pick-up device 302 is rotated by 180° at the initial position as shown in Figure 3a, the wall 308 of the pick-up device 302 will push against the housing portion 112 during an attempt to engage the SAS plug 102 due to the asymmetrical configuration of the pick-up device 302. This advantageously provides a polarization feature for preventing erroneous assembly of the pick-up device 302 on the transfer arm 320 with respect to the SAS plug 102.

Figure 3b shows a schematic perspective view of the S-ATA plug 202 and the pick-up device 302. Here, the surface 318 of the wall 310 abuts the extension wall 210 of the S-ATA plug 202 when the pick-up device 302 resiliently engages the S-ATA plug 202. Again, advantageously lateral movement restraint in one direction is provided by the abutment of the surface 318 with the extension wall 210.

The pick-up device 302 is held by the vacuum suction head 319 of the computer-controlled transfer arm 320 at a position for engaging the S-ATA plug 202 at substantially a central position with respect to the S-ATA plug 202. If the pick-up device 302 is rotated by 180° at the initial position as shown in Figure 3b, wall 308 of the pick-up device 302 will push against the extension walls 210, 212 during an attempt to engage the SAS plug 102 due to the asymmetrical configuration of the pick-up device 302. This advantageously provides a polarization feature for preventing erroneous assembly of the pick-up device 302 on the transfer arm 320 with respect to the S-ATA plug 202.

Figure 4 shows a schematic perspective view of another pick-up device 402. The pick-up device 402 comprises a main body plate 404 and a first wall 406 extending from the plate 404. A second wall 408 is disposed spaced apart from, and along the first wall 406. The plate 404 has a cut-out at a corner 405. The cut-out reduces the weight of the pick-up device 402 and can balance the overall weight after the pick-up device 402 engages the SAS plug 102 or the S-ATA plug 202.

The wall 406 comprises an abutment portion in the form of a wall portion 410 disposed at one end of the first wall 406. The wall portion 410 extends substantially transversely to the first wall 406. The pick-up device 402 further comprises a third wall

412 disposed at one end of the wall portion 410. The third wall 412 is substantially parallel to the first wall 406 and extends away from the first wall 406. The pick-up device 402 further comprises a raised portion in the form of an end wall 414 at one end of the third wall 412 away from the first wall 406. The end wall 414 has a surface 416 opposite a surface 418 of the wall portion 410. The walls 406, wall 412 and end wall 414 are formed integrally on the main body plate 404.

A slanted inner surface 420 extends along the first wall 406, the third wall 412 and end wall 414. The second wall 408 of the pick-up device 402 has an inwardly facing slanted protrusion 422 for facilitating the resilient engagement of the pick-up device 402 and the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2).

For pick-up of the SAS plug 102 or the S-ATA plug 202, the pair of the first wall 406 and the second wall 408 of the pick-up device 402 resiliently engage the central wall 114 of the SAS plug 102 or the central wall 214 of the S-ATA plug 202. The surface 416 of the end wall 414 and the surface 418 of the first wall 412 abut respective ends of the housing portion 112 of the SAS plug 102 (Figure 1) or the extension walls 210, 212 of the S-ATA plug 202 (Figure 2) respectively. It will be appreciated that in the engaged position of the pick-up device 402 and the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2), lateral movement between the pick-up device 402 and the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2) is thus restrained in two directions. This advantageously further increases handling and positioning accuracy of the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2).

The pick-up device 402 is held by a vacuum suction head (not shown) of a computer-controlled transfer arm (not shown) at a position for engaging the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2) at a central position of the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2). Again, if the pick-up device 402 is rotated by 180° at the initial central position with respect to the plug, the second wall 408 of the device 402 will push against the housing portion 112 of the SAS plug 102 (Figure 1) or the extension walls 210, 212 of the S-ATA plug 202 (Figure 2) due to the asymmetrical configuration of the pick-up device 402. This advantageously provides a polarization feature for preventing erroneous assembly of the pick-up

device 402 on the transfer arm with respect to the SAS plug 102 (Figure 1) or the S-ATA plug 202 (Figure 2).

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.

CLAIMS

1. A pick-up device for a plug, the pick-up device comprising:
 - a main body;
 - a pair of walls extending from the main body for resiliently engaging a portion of the plug therebetween;
 - wherein one of the walls comprises an abutment portion extending substantially transversely to said one wall; and
 - the abutment portion comprises a first abutment surface for abutment with a surface portion of the plug for effecting movement restraint of the pick-up device in at least one lateral direction when the pick-up device engages the plug.
2. The pick-up device as claimed in claim 1, wherein the abutment portion is disposed at an end of said one wall.
3. The pick-up device as claimed in claims 1 or 2, further comprising a further wall extending from the main body and having a second abutment surface for abutment with another surface portion of the plug.
4. The pick-up device as claimed in claim 3, wherein the first and second abutment surfaces are disposed for effecting movement restraint of the pick-up device in two lateral directions when the pick-up device engages the plug.
5. The pick-up device as claimed in claim 4, wherein the abutment portion and the further wall are disposed such that the first and second abutment surfaces face each other.
6. The pick-up device as claimed in any one of claims 3 to 5, further comprising a intermediate wall extending from the main body and between the abutment portion of said one of the pair of walls and the further wall portion.
7. The pick-up device as claimed in claim 6, wherein the intermediate wall is substantially parallel to said one of the pair of walls.

8. The pick-up device as claimed in any one of the preceding claims, wherein said one wall of the pair of walls, the further wall and the intermediate wall integrally on the main body.

9. The pick-up device as claimed in any one of the preceding claims, wherein the pick-up device is arranged for use with a SAS plug and a S-ATA plug.

10. An assembly comprising:

a pick-up device;

a plug;

wherein the pick-up device comprises:

a main body;

a pair of walls extending from the main body for resiliently engaging a portion of the plug therebetween;

wherein one of the walls comprises an abutment portion extending substantially transversely to said one wall; and

the abutment portion comprises a first abutment surface for abutment with a surface portion of the plug for effecting movement restraint of the pick-up device in at least one lateral direction when the pick-up device engages the plug.