

Description

The present invention relates to a tape having a series of pockets along its length for storage of electronic components see e.g. GB-A-2 163 401.

An electronic flatpack is a relatively thin package containing numerous electronic components and which is rectilinear in shape (being either square or rectangular) provided on all four side faces with protruding, cranked or gull wing, connector pins, which are generally made of fine closely spaced wires for connection of the components to a printed circuit. The connector pins are numerous to convey signals to and from the numerous components contained within the flatpack and as the packing density of these components increases so the gauge of the pins and the spacing of the pins decreases so that in flatpacks which are currently available the pins are filigree in nature and highly vulnerable to damage or distortion prior to being secured to the printed circuit.

Conventionally, before assembly on a printed circuit these flatpacks are stored in trays of about thirty in respective recesses and the trays are stacked one on top of another. This does not provide for adequate security or protection against damage to the connector pins since the trays may be upset leading to a spillage of flatpacks. The flatpacks are relatively free to move within their respective recesses which leads to damaged pins during movement of the trays and the trays are open at the top leading to contamination of the flatpacks by dust and dirt.

Removal of the flatpack from the tray recess is often an automatic process in which a pick-up device such as a suction nozzle is placed in contact with and lifts the flatpack. Often, however, the lift is not vertical and the protruding cranked connector pins are deformed or broken off due to contact with the walls or floor of the recess making the flatpack difficult or impossible to fit to the printed circuit, or inoperative.

It is an object of the present invention to obviate or substantially mitigate the aforementioned problems.

According to one aspect of the present invention there is provided a tape for storage of electronic components, said tape comprising a series of pockets along its length, each pocket having a floor disposed at a predetermined depth from the plane of the tape, a portion of which floor is inwardly deformed to define a protrusion extending in a generally rectilinear fashion around the pocket, the protrusion being profiled to define a support surface disposed at a first clearance from said floor and a ridge extending along the outer peripheral boundary of the support surface, the top of the ridge being disposed at a second clearance from said floor, the second clearance being greater than the first clearance, and the ridge being spaced by a third clearance from the walls of said pocket, the arrangement being such that each pocket is adapted

to store an electronic flatpack having protruding connector pins, the body of the flatpack being carried by the support surface and restricted in lateral movements by the ridge, with the cranked connector pins being disposed over said ridge and extending into said third clearance.

Preferably said pocket is square in outline and said protrusion has four separated portions respectively aligned with the walls of said pocket.

Preferably also said tape is made of a semi-rigid material so that the tape portions separating adjacent pockets are capable of providing a hinge function whereby the tape can be wound on a storage reel without distortion of the individual pockets.

According to a further aspect of the present invention there is provided a tape as defined in the third preceding paragraph wound on a storage reel, each pocket of said tape containing an electronic flatpack which is carried by said protrusion, a cover film being releasably secured along the length of the tape and extending across the openings into said pockets.

Preferably the cover film is adhesively secured to the tape along two lines of adhesion respectively adjacent the two longitudinal edges of the tape.

Preferably both longitudinal edges of said tape are provided with a row of sprocket holes to enable engagement with a pull-off sprocket which whereby the tape can be controllably pulled off the reel.

Preferably the tape is provided with about 250 pockets along its length.

By virtue of the present invention an electronic flatpack having protruding cranked connector pins is stored in a pocket disposed on a tape and is carried by a support surface formed by inward deformation of a portion of said pocket floor, said support surface facilitating removal of said flatpack using a suction nozzle with minimal contact between said connector pins and the walls of said pocket.

An embodiment of the present invention will now be described with reference to the accompanying drawings in which:-

Fig. 1 shows a plan view of part of a tape in accordance with the present invention;

Fig. 2 shows a sectional view of the tape taken on the line A-A of Fig. 1 and with a flatpack;

Figs. 3 and 4 schematically illustrate removal of a flatpack from the Fig. 1 tape.

With reference to Fig. 1 a tape 10 in accordance with the present invention comprises a series of pockets 12 along its length, only one of which is shown in the interests of clarity. The tape is made of semi-rigid plastics material and the pockets, which are square in outline, are separated from one another along the length of the tape by tape portions 13 which are bendable so as to function as hinge like portions. The pockets 12 by virtue of being pressed or moulded out of the original plane 8 of the tape are relatively rigid. Each pocket 12 has walls 16 and a pocket floor 12A, at a

depth W from the original plane 8 of the tape, (shown in Fig. 2), which is inwardly deformed to define a protrusion 14 around the pocket floor 12A with portions in alignment with the pocket walls 16. The protrusion 14 is itself profiled to define a support surface 14A (which also extends generally rectilinearly) disposed at a first clearance X from the pocket floor 12A and a ridge 14B which extends along the outer peripheral boundary of the support surface 14A, being offset from the longitudinal centre line of the support surface 14A towards the pocket walls 16. The top of the ridge 14B is disposed at a second clearance Y from the pocket floor 12A and is spaced by a third clearance Z from the walls 16 of the pocket.

The protrusion 14 shown in Fig. 1 is formed by four separated portions 14C, 14D, 14E, 14F which are respectively aligned with the walls 16 of the pocket 12. It will, however be appreciated that the protrusion 14 could be unitary and extend in a generally rectilinear fashion around the pocket floor. Also, the pocket and the protrusion may both be either square or rectangular in outline according to the outline shape of the flatpack 18 which is to be housed. Currently known flatpacks are either square or rectangular in outline.

As can be seen in Fig. 2 the flatpack 18 has a relatively thin body 19 from which protrude cranked connector pins 20 which are very fragile. The body 19 is of predetermined dimensions and is carried in the pocket 12 by the support surface 14A with the pins 20 disposed over the ridge 14B and projecting into the third clearance Z. The thickness of the body 19 governs the dimension W-X so that the upper surface of the body 19 is essentially aligned with the original plane 8 of the tape 10 and a cover film 21 is releasably secured over the opening into the pocket 12 to hold the flatpack 18 onto the support surface 14A. Film 21 extends along the length of the tape 10 and is secured thereto by only two longitudinally extending lines of adhesive 25 (Fig. 1) which respectively lie between a tape edge and a pocket edge. This arrangement facilitates peel back of the film when the tape is in use as will be explained. Also, along each tape edge, and laterally outside the cover film 21 are rows of sprocket holes 23 which permit the tape 10 to be controllably unwound from its storage reel 24A (shown in Fig. 4).

During assembly of a printed circuit which requires a number of flatpacks 18 the tape is unwound from the reel 24A by a pull-off sprocket 24B which is controllably indexed to present a flatpack 18 at a withdrawal station 26. The cover film 21 is peeled back around rollers 25A and 25B to expose the flatpack at station 26 whereat a suction nozzle 22 is moved to engage and lift the flatpack 18 from the pocket 12 as schematically shown in Fig. 4. There is a small inspection hole 7 in base of the tape to line up suction nozzle 22 at the station 26. If, as shown in Fig. 3, the lift is

not orthogonal to the floor 12A of the pocket 12 and the flatpack 18 is removed at an angle, because the support surface 14A is disposed from the pocket floor by a clearance X and the ridge 14B is disposed at a clearance Z from the pocket wall 16 and by clearance Y from floor 12A the pins 20A are prevented from coming into contact with the wall 16 or the floor 12A so that damage to the pins 20A is prevented. Following removal of the flatpack 18 from the pocket 12 the tape is indexed forward by sprocket wheel 24B and is engaged by a chopping device 27 which chops the used tape into short lengths for subsequent disposal.

The support surface 14A surrounds a hollow to provide strength to the protrusions 14C, 14D, 14E, 14F. The tape is fabricated of a semi-rigid plastics material such as polystyrene or PVC to facilitate winding of the tape onto the reel 24A. Additionally the film covering the pockets on the tape may be transparent to allow inspection of the flatpacks therein.

Claims

1. A tape (10) for storage of electronic components, said tape comprising a series of pockets (12) along its length, characterised in that a portion of the floor (12A) of each pocket (12) is inwardly deformed to define a protrusion (14) extending in a generally rectilinear fashion around the pocket floor (12A), the protrusion (14) being profiled to define a generally rectilinear support surface (14A) disposed at a first clearance (X) from said floor and a ridge (14B) extending along the outer peripheral boundary of the support surface (14A), the top of the ridge (14B) being disposed at a second clearance (Y) from said floor, the second clearance (Y) being greater than the first clearance (X), and the ridge (14B) being spaced by a third clearance (Z) from the walls (16) of said pocket (12), the arrangement being such that each pocket (12) is adapted to store an electronic flatpack (18) having protruding connector pins (20), the body (19) of the flatpack being carried by the support surface (14A) and restricted in lateral movements by the ridge (14B), with the cranked connector pins (20) being disposed over said ridge (14B) and extending into said third clearance (Z).
2. A tape (10) as claimed in claim 1, characterised by said pocket (12) being square in outline and the protrusion (14) having four separated portions (14C, 14D, 14E, 14F) respectively aligned with the walls (16) of said pocket (12).
3. A tape (10) as claimed in either preceding claim, characterised by the tape (10) being made of a semi-rigid plastics material so that the tape por-



depth W from the original plane 8 of the tape, (shown in Fig. 2), which is inwardly deformed to define a protrusion 14 around the pocket floor 12A with portions in alignment with the pocket walls 16. The protrusion 14 is itself profiled to define a support surface 14A (which also extends generally rectilinearly) disposed at a first clearance X from the pocket floor 12A and a ridge 14B which extends along the outer peripheral boundary of the support surface 14A, being offset from the longitudinal centre line of the support surface 14A towards the pocket walls 16. The top of the ridge 14B is disposed at a second clearance Y from the pocket floor 12A and is spaced by a third clearance Z from the walls 16 of the pocket.

The protrusion 14 shown in Fig. 1 is formed by four separated portions 14C, 14D, 14E, 14F which are respectively aligned with the walls 16 of the pocket 12. It will, however be appreciated that the protrusion 14 could be unitary and extend in a generally rectilinear fashion around the pocket floor. Also, the pocket and the protrusion may both be either square or rectangular in outline according to the outline shape of the flatpack 18 which is to be housed. Currently known flatpacks are either square or rectangular in outline.

As can be seen in Fig. 2 the flatpack 18 has a relatively thin body 19 from which protrude cranked connector pins 20 which are very fragile. The body 19 is of predetermined dimensions and is carried in the pocket 12 by the support surface 14A with the pins 20 disposed over the ridge 14B and projecting into the third clearance Z. The thickness of the body 19 governs the dimension W-X so that the upper surface of the body 19 is essentially aligned with the original plane 8 of the tape 10 and a cover film 21 is releasably secured over the opening into the pocket 12 to hold the flatpack 18 onto the support surface 14A. Film 21 extends along the length of the tape 10 and is secured thereto by only two longitudinally extending lines of adhesive 25 (Fig. 1) which respectively lie between a tape edge and a pocket edge. This arrangement facilitates peel back of the film when the tape is in use as will be explained. Also, along each tape edge, and laterally outside the cover film 21 are rows of sprocket holes 23 which permit the tape 10 to be controllably unwound from its storage reel 24A (shown in Fig. 4).

During assembly of a printed circuit which requires a number of flatpacks 18 the tape is unwound from the reel 24A by a pull-off sprocket 24B which is controllably indexed to present a flatpack 18 at a withdrawal station 26. The cover film 21 is peeled back around rollers 25A and 25B to expose the flatpack at station 26 whereat a suction nozzle 22 is moved to engage and lift the flatpack 18 from the pocket 12 as schematically shown in Fig. 4. There is a small inspection hole 7 in base of the tape to line up suction nozzle 22 at the station 26. If, as shown in Fig. 3, the lift is

not orthogonal to the floor 12A of the pocket 12 and the flatpack 18 is removed at an angle, because the support surface 14A is disposed from the pocket floor by a clearance X and the ridge 14B is disposed at a clearance Z from the pocket wall 16 and by clearance Y from floor 12A the pins 20A are prevented from coming into contact with the wall 16 or the floor 12A so that damage to the pins 20A is prevented. Following removal of the flatpack 18 from the pocket 12 the tape is indexed forward by sprocket wheel 24B and is engaged by a chopping device 27 which chops the used tape into short lengths for subsequent disposal.

The support surface 14A surrounds a hollow to provide strength to the protrusions 14C, 14D, 14E, 14F. The tape is fabricated of a semi-rigid plastics material such as polystyrene or PVC to facilitate winding of the tape onto the reel 24A. Additionally the film covering the pockets on the tape may be transparent to allow inspection of the flatpacks therein.

Claims

1. A tape (10) for storage of electronic components, said tape comprising a series of pockets (12) along its length, characterised in that a portion of the floor (12A) of each pocket (12) is inwardly deformed to define a protrusion (14) extending in a generally rectilinear fashion around the pocket floor (12A), the protrusion (14) being profiled to define a generally rectilinear support surface (14A) disposed at a first clearance (X) from said floor and a ridge (14B) extending along the outer peripheral boundary of the support surface (14A), the top of the ridge (14B) being disposed at a second clearance (Y) from said floor, the second clearance (Y) being greater than the first clearance (X), and the ridge (14B) being spaced by a third clearance (Z) from the walls (16) of said pocket (12), the arrangement being such that each pocket (12) is adapted to store an electronic flatpack (18) having protruding connector pins (20), the body (19) of the flatpack being carried by the support surface (14A) and restricted in lateral movements by the ridge (14B), with the cranked connector pins (20) being disposed over said ridge (14B) and extending into said third clearance (Z).
2. A tape (10) as claimed in claim 1, characterised by said pocket (12) being square in outline and the protrusion (14) having four separated portions (14C, 14D, 14E, 14F) respectively aligned with the walls (16) of said pocket (12).
3. A tape (10) as claimed in either preceding claim, characterised by the tape (10) being made of a semi-rigid plastics material so that the tape por-



tions (13) separating adjacent pockets (12) are capable of providing a hinge function whereby the tape (10) can be wound on a storage reel without distortions of the individual pockets (12).

4. A tape (10) as claimed in any one of claims 1 to 3, characterised by each pocket (12) of the tape (10) containing an electronic flatpack (18) which is carried by said protrusion (14), a cover film (21) being releasably secured along the length of the tape (10) covering the opening of each pocket (12) and abutting the body of the flatpack, said tape (10) being wound on a reel.
5. A tape (10) as claimed in claim 4, characterised by said tape (10) having a row of apertures (23) along its edges to enable engagement with a pull-off sprocket.
6. A tape (10) as claimed in claim 4 or claim 5, characterised by said cover tape (21) being transparent for inspection of enclosed flatpacks (18).

Patentansprüche

1. Gurt (10) zur Speicherung von elektronischen Bauelementen, wobei der Gurt eine Reihe von Taschen (12) entlang seiner Länge aufweist, dadurch gekennzeichnet, daß ein Teil des Bodens (12A) jeder Tasche (12) nach innen deformiert ist, um einen Vorsprung (14) zu bilden, der sich allgemein rechteckig um den Taschenboden (12A) erstreckt, wobei der Vorsprung (14) profiliert ist, um eine allgemein rechteckige Stützfläche (14A) zu bilden, die in einem ersten Abstand (X) vom Boden angeordnet ist, und eine Rippe (14B) zu bilden, die sich entlang des äußeren peripheren Randes der Stützfläche (14A) erstreckt, wobei die Oberkante der Rippe (14B) in einem zweiten Abstand (Y) von dem Boden angeordnet ist und der zweite Abstand (Y) größer als der erste Abstand (X) ist, und daß die Rippe (14B) in einem dritten Abstand (Z) von den Wänden (16) der Tasche (12) angeordnet ist und die Anordnung dergestalt ist, daß jede Tasche (12) in der Lage ist, ein elektronisches Flachgehäuse (18) mit abstehenden Anschlußstiften (20) aufzunehmen, wobei der Körper (19) des Flachgehäuses durch die Stützfläche (14A) getragen und in seinen seitlichen Bewegungen durch die Rippe (14B) eingeschränkt wird, und wobei die abgewinkelten Anschlußstifte (20) über der Rippe (14B) angeordnet sind und sich in den dritten Abstand (Z) erstrecken.
2. Gurt (10) nach Anspruch 1, dadurch gekennzeichnet, daß die Tasche (12) im Umriß quadra-

tisch ist und daß der Vorsprung (14) vier getrennte Teile (14C, 14D, 14E, 14F) aufweist, die entsprechend zu den Wänden (16) der Tasche (12) ausgerichtet sind.

3. Gurt (10) nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß der Gurt (10) aus einem halbsteifen Plastikmaterial besteht, so daß die benachbarte Taschen (12) trennenden Gurtteile (13) in der Lage sind, eine Gelenkfunktion vorzugeben, wodurch der Gurt (10) auf eine Speicherrolle ohne Beeinträchtigungen der einzelnen Taschen (12) gewickelt werden kann.
4. Gurt (10) nach irgendeinem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß jede Tasche (12) des Gurtes (10) ein elektronisches Flachgehäuse (18) enthält, das durch den Vorsprung (14) getragen wird, daß ein Deckfilm (21) entferntbar entlang der Länge des Gurtes (10) befestigt ist, die Öffnung jeder Tasche (12) abdeckt und an dem Körper des Flachgehäuses anliegt und daß der Gurt (10) auf eine Rolle gewickelt ist.
5. Gurt (10) nach Anspruch 4, dadurch gekennzeichnet, daß der Gurt (10) eine Reihe von Löchern (23) entlang seiner Kanten aufweist, um den Eingriff mit einer Abzugs-Perforationswalze zu ermöglichen.
6. Gurt (10) nach Anspruch 4 oder Anspruch 5, dadurch gekennzeichnet, daß das Deckband (21) transparent für die Inspektion der enthaltenen Flachgehäuse (18) ist.

Revendications

1. Bande (10) pour le stockage de composants électroniques, ladite bande comprenant une série de poches (12) sur sa longueur, caractérisée en ce qu'une partie du fond (12A) de chaque poche (12) est déformée vers l'intérieur de manière à définir une banquette en relief (14) s'étendant de façon sensiblement rectiligne autour du fond de la poche (12A), la banquette (14) étant profilée de manière à définir une surface support sensiblement rectiligne (14A) située à une première distance (X) dudit fond et une nervure (14B) s'étendant le long de la périphérie extérieure de la surface support (14A), le sommet de la nervure (14B) étant situé à une deuxième distance (Y) dudit fond, la deuxième distance (Y) étant plus grande que la première distance (X), et la nervure (14B) étant située à une troisième distance (Z) des parois (16) de la dite poche (12), l'agencement étant tel que chaque poche (12) peut contenir un boîtier



électronique plat (18) comportant des broches de connexion en saillie (20), le corps (19) du boîtier plat étant porté par la surface support (14A) et retenu dans ses mouvements latéraux par la nervure (14B), les broches de connexion coudées (20) étant disposées au-dessus de ladite nervure (14B) et s'étendant dans ledit troisième espace (Z).

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2. Bande (10) suivant la revendication 1, caractérisée en ce que ladite poche (12) a un contour carré et la banquette (14) comprend quatre parties séparées (14C, 14D, 14E, 14F) respectivement alignées avec les parois (16) de ladite poche (12).

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3. Bande (10) suivant une quelconque des revendications précédentes, caractérisée en ce que la bande (10) est fabriquée en une matière plastique semi-rigide, de sorte que les parties de bande (13) séparant les poches adjacentes (12) peuvent jouer un rôle de charnière, ce qui permet d'enrouler la bande (10) sur une bobine de stockage sans déformation des poches individuelles (12).

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4. Bande (10) suivant une quelconque des revendications 1 à 3, caractérisée en ce que chaque poche (12) de la bande (10) contient un boîtier électronique plat (18) qui est porté par ladite banquette (14), un film de couverture (21) étant fixé de façon séparable sur la longueur de la bande (10) de manière à couvrir l'ouverture de chaque poche (12) et à buter contre le corps du boîtier plat, ladite bande (10) étant enroulée sur une bobine.

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5. Bande (10) suivant la revendication 4, caractérisée en ce que ladite bande (10) comporte une rangée de perforations (23) le long de ses bords, pour permettre l'accouplement avec un pignon d'extraction.

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6. Bande (10) suivant la revendication 4 ou la revendication 5, caractérisée en ce que ledit film de couverture (21) est transparent, pour permettre l'inspection des boîtiers plats stockés (18).

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