

"TAPE STRUCTURE FOR CARRYING ELECTRICAL COMPONENTS"

5 The present invention relates to a tape structure adapted to carry electrical components, such as resistors, capacitors and transistors, each having terminal legs, and to a base tape for use in such a structure.

10 It is known to provide an assembly line, in which electrical components, such as resistors, capacitors and transistors are disposed in a line, spaced apart by predetermined pitch, and carried by a tape structure.

15 As shown in Figure 1, the tape structure 20 comprises a base tape 50 and an adhesive tape 60. The base tape 50 has perforations 80 formed along the centre thereof with a predetermined pitch. The
20 perforations are used in cooperation with a drive system for guiding and advancing the tape structure. Each component 10 comprises a body portion 30 and terminal legs (two in this example) 40a and 40b extend from the body portion 30. The
25 components 10 are supported by the tape structure such that terminal legs 40a and 40b are transverse the base tape 50 and are held in place by the adhesive tape 60 which is along the length of the base tape and over the legs. When the adhesive tape
30 is applied, corrugations 70a and 70b are formed in the tape where it covers the terminal legs 40a and 40b.

35 Base tape 50 comprises, for example, a relatively strong and thick paper, such as craft paper, whereas adhesive tape 60 comprises, for

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example, a thermoplastic with a coating of a thermoplastic adhesive on one side. One example of the above-described tape structure is disclosed in U.S. Patent No. 4,453,633.

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The tape structure as described above is set in an automatic insertion machine (not shown), which cuts the tape structure into segments A0. As shown in Figure 2, each segment A0 is held between a pallet 12 and a pair of pressure arms 11a and 11b, and is carried to a severing station where the terminal legs are cut to separate each component from the tape structure. The separated component 10 is carried by a holder (not shown) and its terminal legs are inserted into, for example, holes in a printed circuit board.

In order for example to reduce wastage the width of adhesive tape 60 may be less than half the width of the base tape 50, and the terminal legs may be shortened so as to extend only half-way across the base tape. The width of the base tape should be maintained the same so that the tape structure can be loaded into the automatic insertion machine without any adaptation thereof. When a tape structure with a full size adhesive tape and full length terminal legs is used, such as disclosed in U.S. Patent No. 4,243,139, each segment A0 can be secured tightly between the pallet 12 and the arms 11a and 11b, because both pressure arms 11a and 11b fit between successive corrugations. However, when the tape structure shown in Figures 1 and 2 is used, only the pressure arm 11b is held between corrugations 70a and 70b. The other pressure arm 11a is placed on a plain area of base tape 50. Accordingly, segment A0 can pivot, as indicated by an arrow X, about a point

under the end of arm 11b, particularly while the tape is conveyed to or is at the severing station. If the terminal legs are severed while the segment is displaced, the holder may pick up the separated component with the terminal legs misdirected and the component may not be properly inserted into the printed circuit board.

According to the invention there is provided a tape structure comprising a base tape; an attachment tape having a width which is approximately half the width of said base tape, said attachment tape extending along and over a first half-side of said base tape, said base tape and said attachment tape being bonded together so as to support terminal legs of electrical components between said base tape and said attachment tape thereby defining corrugations in said attachment tape where said terminal legs are located; and protuberances formed from the base tape provided on a second half-side of said base tape.

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In the accompanying drawings:

Figure 1 is a fragmentary plan view of a tape structure according to the prior art;

5 Figure 2 is a perspective view showing a manner in which a cut-out segment of the prior art tape structure is carried;

Figure 3 is a fragmentary plan view of a tape structure according to a first embodiment of the present invention;

10 Figure 4 is a perspective view showing a manner in which a cut-out segment of the tape structure of the first embodiment is carried;

Figure 5 is a cross-sectional view taken along a line V-V shown in Figure 3;

15 Figure 6 is a fragmentary plan view of a tape structure according to a second embodiment of the present invention;

Figure 7 is a cross-sectional view taken along a line VII-VII shown in Figure 6;

20 Figure 8 is a fragmentary plan view of a tape structure according to a third embodiment of the present invention;

Figure 9 is a cross-sectional view taken along a line IX-IX shown in Figure 8;

25 Figure 10 is a fragmentary plan view of a tape structure according to a fourth embodiment of the present invention;

Figure 11 is a cross-sectional view taken along a line XI-XI shown in Figure 10;

30 Figure 12 is a fragmentary plan view of a tape structure according to a fifth embodiment of the present invention; and

Figure 13 is a cross-sectional view taken along a line XIII-XIII shown in Figure 12.

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Figure 3 illustrates a tape structure 2 according to a first embodiment of the present invention. The tape structure 2 of the present invention is for supporting electronic or electrical components 1, such as resistors, capacitors and transistors which are aligned with a predetermined pitch. Each component 1 is defined by a body portion 3 and usually two terminal legs 4a and 4b extending from body portion 3. It is possible to support components that have more than two terminal legs or only one terminal leg.

The tape structure shown comprises a base tape 5 and an attachment tape or an adhesive tape 6. Adhesive tape 6 has a width Q which is less than half the width P of base tape 5, and it extends parallel to and along the upper half portion of base tape 5, as shown in Figure 3. Base tape 5 and adhesive tape 6 are bonded together so as to support components 1 between tapes 5 and 6. More specifically, the components 1 are supported by the tape structure such that terminal legs 4a and 4b extend half-way across base tape 5 and are held in place by adhesive tape 6 applied along the base tape and over the terminal legs 4a and 4b corrugations 7a and 7b in the adhesive tape being formed where the tape covers legs 4a and 4b.

The base tape 5 has perforations 8 formed along the centre thereof with a predetermined pitch between them. The perforations are used for guiding and advancing the tape structure. The base tape 5 comprises, for example, a relatively strong and thick paper, such as a craft paper, whereas adhesive tape 6 comprises, for example, a thermoplastic with a coating of a thermoplastic adhesive on one side. In

this case, the bonding of the two tapes may be performed by the application of heat. Any other suitable flexible materials can be used for base tape 5 or for adhesive tape 6. Also the bonding of the two tapes can be done by any other known manner, for example, by the application of a bonding agent.

According to the first embodiment, base tape 5 is further formed with protuberances 90a and 90b in the lower half portion of base tape 5, as viewed in Figure 3, each being aligned with a respective one of the corrugations 7a and 7b. Each of the protuberances 90a and 90b of the first embodiment has a semi-spherical configuration, and may be formed by embossing.

The tape structure as described above is set in an automatic insertion machine (not shown), which cuts the tape structure to segments A0. As shown in Figure 4, each segment A0 is held between a pallet 12 and a pair of pressure arms 11a and 11b, and is carried to a severing station where the terminal legs are cut to separate the component from the tape structure. The separated component 10 is carried by a holder (not shown) and is inserted into a printed circuit board. According to the first embodiment, arm 11a fits in between protuberances 90a and 90b, as shown in Figure 5, and, at the same time, arm 11b fits in between the associated corrugations 7a and 7b. Accordingly, segment A0 will not be pivoted while the tape structure is conveyed to or is at the severing station.

Figures 6 and 7 illustrate a tape structure according to a second embodiment of the present invention. In this embodiment, instead of

protuberances 90a and 90b, protuberances 92a and 92b are formed in the lower half portion of base tape 5 along the lines of corrugations 7a and 7b respectively. Each protuberance 92a and 92b of the second embodiment is formed by cutting base tape 5 in a shape of "U" and raising the tongue portion upwards. The tongue portions 92a and 92b face each other, so that arm 11a can be fitted between the tongues, as shown in Figure 7.

Figures 8 and 9 illustrate a tape structure according to a third embodiment of the present invention. In this embodiment, the protuberances 94a and 94b are positioned similarly to the protuberances 90a and 90b but each is in the form of a ridge aligned with a respective one of the corrugations 7a and 7b, and formed by, for example, embossing. Figure 9 shows the pressure arm 11a fitting between the ridges 94a and 94b.

Figures 10 and 11 illustrate another embodiment in which, instead of protuberances 94a and 94b, a single ridged protuberance 96 (formed by, for example, embossing) is positioned on a line between, preferably half-way between, the corrugations 7a and 7b, so that a groove 11c formed in the face of the pressure arm 11a engages protuberance 96, as shown in Figure 11.

Figures 12 and 13 illustrate a tape structure in which, instead of protuberances 90a and 90b there is an archipelago of small protuberances 98 each with an open centre. The protuberances 98 may be formed in a regular pattern each with equal distances separating it from its neighbours; they may be positioned randomly. When the arm 11a comes down

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on segment A0, any protuberance 98 placed under the pressing face of arm 11a will be depressed, so that arm 11a may engage protuberances 98 which surround the arm 11a and any protuberance within the groove 11c, as shown in Figure 13.

Thus as described above, the components are attached to one half-side portion of base tape 5 by the attachment of adhesive tape, and protuberances are provided at the other half-side portion of base tape 5 so as to make an anti-slip surface for engagement by the pressure arm 11a.



CLAIMS:

1. A tape structure comprising a base
5 tape; an attachment tape having a width which is
approximately half the width of said base tape, said
attachment tape extending along and over a first
half-side of said base tape, said base tape and said
10 attachment tape being bonded together so as to
support terminal legs of electrical components
between said base tape and said attachment tape
thereby defining corrugations in said attachment tape
where said terminal legs are located; and
15 protuberances formed from the base tape provided on a
second half-side of said base tape.

2. A tape structure as claimed in claim 1,
wherein said protuberances are hemi-spherical and
each aligned with a respective corrugation.

3. A tape structure as claimed in claim 1,
wherein said protuberances each comprise a cut-out
tongue portion projecting from the base tape, each
portion being aligned with a respective corrugation.

4. A tape structure as claimed in claim 1,
wherein said protuberances are in the form of ridges
disposed transversely of the base tape.

5. A tape structure as claimed in claim 4,
wherein said ridges are disposed parallel to the
corrugations and either aligned with or between lines
extending from the corrugations.

6. A tape structure as claimed in claim 1,
wherein said protuberances are in groups of



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open-centred protuberances.

5 7. A tape structure as claimed in any
 foregoing claim, wherein said attachment tape has an
 adhesive agent deposited thereon for the bonding on
 said base tape.

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