

BOTTOM COVER TAPE FOR ELECTRONIC PART CARRIER

Background of the Invention

1. Field of the Invention

5 The present invention relates to a bottom cover tape for electronic part carrier for use in conveyance of chip type electronic parts. More particularly, the invention relates to a bottom cover tape having an excellent adhesivity to carrier tape, good antistatic properties and excellent anti-blocking
10 properties and corrosion-inhibiting properties with respect to chip parts.

2. Description of the Related Art

 Referring to how chip type electronic parts (chip parts) such as chip fixed resistor and laminated ceramic capacitor
15 are conveyed, a paper carrier (carrier tape) made of tape-like cardboard having rectangular holes for receiving a chip type electronic part punched therein in the longitudinal direction at a constant interval is heat-sealed (taped) with a bottom cover tape at the lower surface thereof to form receiving pockets.
20 Chip type electronic parts are each immediately received in the respective receiving pockets. The paper carrier is then heat-sealed with a top cover tape to encapsulate the chip type electronic parts therein. The paper carrier is then wound on a reel for conveyance. Such a continuous taping reel process
25 is widely used. At the step of producing circuit board or the

like to which the paper carrier is conveyed, the top cover tape is peeled off the paper carrier so that the chip type electronic parts received therein can be automatically sucked by an air nozzle, and then supplied onto circuit board. Such an automatic
5 assembly system is mainly used.

In this automatic assembly system, the bottom cover tape is glued to the carrier tape. It is thus important that the bottom cover tape has a good adhesivity to the carrier tape.

In recent years, a phenomenon has occurred that chip parts
10 cannot be sucked by the air nozzle, bringing about a problem of drop of sucking efficiency. This problem is presumably attributed to the adhesion of chip parts to the surface of the adhesive layer caused by the generation of electrostaticity on the bottom cover tape accompanying the further reduction
15 of size and weight of chip parts, caused by the force developed when the air nozzle presses chip parts against the adhesive layer or caused by insufficient cooling of the adhesive layer due to the reduction of time between application of bottom cover tape and reception of chip part in the receiving pocket.

20 Amid these apprehensions, a serious problem occurs that chip parts are corroded by the bottom cover tape. It has thus been desired to provide a bottom cover tape which can inhibit or prevent the corrosion of chip parts and exhibits an excellent reliability with respect to chip parts.

25 Summary of the Invention

It is therefore an object of the invention to provide a bottom cover tape for electronic part carrier which exhibits an excellent adhesivity to carrier tape as well as excellent antistatic properties and excellent anti-blocking properties and corrosion-inhibiting properties with respect to chip parts.

The inventors made extensive studies of solution to the foregoing problems. As a result, it was found that the formation of the adhesive layer on the supporting base material layer in the bottom cover tape for electronic part carrier by a specific resin composition makes it possible to meet all of the requirements for adhesivity to carrier tape, antistatic properties, and anti-blocking properties and corrosion-inhibiting properties with respect to chip parts.

The invention provides a bottom cover tape for electronic part carrier comprising a supporting base material layer and an adhesive layer containing alicyclic saturated hydrocarbon resin and an amphoteric surface active agent and/or nonionic surface active agent free of halogen atom and sulfur atom in an amount of from 1 to 50 parts by weight and from 0.1 to 20 parts by weight based on 100 parts by weight of base polymer.

Brief Description of the Drawings

Fig. 1 is a schematic sectional view illustrating an embodiment of the bottom cover tape of the invention; and

Fig. 2 is a schematic longitudinal sectional view illustrating a carrier material for chip type electronic part

comprising the bottom cover tape of Fig. 1 in use.

The Reference Numerals in the drawings are set forth below.

- 1 Bottom cover tape
- 2 Supporting base material layer
- 5 3 Adhesive layer
- 4 Carrier material for chip type electronic part
- 5 Carrier tape
- 6 Top cover tape
- 7 Chip type electronic part

10 Detailed Description of the Invention

Embodiments of implication of the invention will be described hereinafter occasionally in connection with the attached drawings. Fig. 1 is a schematic diagram illustrating an embodiment of the bottom cover tape for electronic part carrier according to the invention. In Fig. 1, the reference numeral 1 indicates a bottom cover tape, the reference numeral 2 indicates a supporting base material layer, and the reference numeral 3 indicates an adhesive layer. The bottom cover tape 1 comprises the supporting base material layer 2, and the adhesive layer 3 provided on the supporting base material layer 2.

(Supporting base material layer 2)

As the supporting base material constituting the supporting base material layer 2 there may be used any material having self-supporting properties. Examples of such a

supporting base material include paper such as Japanese paper, tracing paper, crepe paper, synthetic paper, mixed paper and composite paper, nonwoven fabric, cloth, plastic film or sheet made of thermoplastic resin such as olefin resin (e.g.,
5 polyethylene, polypropylene, ethylene-acid copolymer resin), polypropylene-modified resin and thermoplastic elastomer (e.g., styrene-based thermoplastic elastomer) and polyester (e.g., polyethylene terephthalate, polybutylene terephthalate, polyethylene naphthalate), foil or thin plate made of metal
10 such as copper and aluminum, laminate thereof, etc.

The supporting base material 2 preferably exhibits a melting point of not lower than 90°C. When the melting point of the supporting base material 2 falls below 90°C, it is likely that when the bottom cover tape is thermally contact-bonded
15 to electronic part carrier using a metallic heating iron, the supporting base material 2 can be adhered to the heating iron, making it impossible to accomplish the original purpose of cover.

The surface of the supporting base material layer 2 (surface opposite the adhesive layer 3) may have been subjected
20 to ordinary surface treatment, slip improvement treatment, antistatic treatment, etc. Further, the supporting base material layer 2 may have been subjected to treatment for improving anchoring effect such as ozone treatment and corona treatment on the adhesive layer side thereof. In particular,
25 in the case where the supporting base material is a plastic

film, an anchor coat may be applied to improve anchoring effect.

The thickness of the supporting base material 2 may be widely predetermined depending on the purpose so far as the mechanical strength and handleability thereof cannot be
5 impaired. In practice, however, it is from about 5 μm to 100 μm , preferably from about 10 μm to 50 μm .

(Adhesive layer 3)

The adhesive layer 3 is formed by a thermoplastic adhesive. The thermoplastic adhesive comprises at least a base polymer,
10 an alicyclic saturated hydrocarbon resin, and an amphoteric surface active agent and/or nonionic surface active agent free of halogen atom and sulfur atom. More specifically, the thermoplastic adhesive comprises at least an alicyclic saturated hydrocarbon resin, and an amphoteric surface active
15 agent and/or nonionic surface active agent free of halogen atom and/or sulfur atom in an amount of from 1 to 50 parts by weight and from 0.1 to 20 parts by weight, respectively, based on 100 of the base polymer.

(Base polymer)

20 As the base polymer there may be used a thermoplastic resin such as olefin resin, vinyl acetate resin, polyester resin and styrene resin, a thermoplastic elastomer or the like. These base polymers may be used singly or in combination of two or more thereof.

25 Examples of the olefin resin employable herein include

polyethylene (e.g., low density polyethylene, linear low density polyethylene, metallocene catalyst process polyethylene, high density polyethylene), polyolefin such as polypropylene and ethylene- α -olefin copolymer resin, ethylene
5 copolymer (e.g., ethylene-unsaturated carboxylic acid copolymer such as ethylene-acrylic acid copolymer (EAA) and ethylene-methacrylic acid copolymer (EMAA), ionomer, ethylene-(meth)acrylic acid ester copolymer such as ethylene-methyl acrylate copolymer, ethylene-ethyl acrylate
10 copolymer (EEA) and ethylene-methyl methacrylate copolymer, ethylene-vinyl acetate copolymer (EVA), ethylene-vinyl alcohol copolymer), and polypropylene-modified resin.

Examples of the vinyl acetate resin include polyvinyl acetate, vinyl acetate-(meth)acrylic acid ester copolymer,
15 vinyl acetate-vinyl ester copolymer, and vinyl acetate-maleic acid ester copolymer.

Examples of the thermoplastic elastomer include styrene thermoplastic elastomers (styrene block copolymer, e.g., styrene block copolymer having a styrene content of not smaller
20 than 5% by weight) such as SIS (styrene-isoprene-styrene block copolymer), SBS (styrene-butadiene-styrene block copolymer), SEBS (styrene-ethylene-butylene-styrene block copolymer), SEPS (styrene-ethylene-propylene-styrene block copolymer) and SEP (styrene-ethylene-propylene block copolymer),
25 polyurethane thermoplastic elastomers, polyester

thermoplastic elastomers, and blend thermoplastic elastomers such as polymer blend of polypropylene with EPT (ternary ethylene-propylene rubber).

(Alicyclic saturated hydrocarbon-based resin)

5 As the alicyclic saturated hydrocarbon-based resin there may be used, e.g., resin obtained by fully hydrogenating an aromatic petroleum resin (e.g., C₉-based petroleum resin) (occasionally referred to as "alicyclic saturated petroleum resin"). Specific examples of such a resin include ESCOREZ5300
10 and ESCOREX5380 (trade name of products of Exxon Mobil Corporation).

These alicyclic saturated hydrocarbon resins may be used singly or in combination of two or more thereof. In the case where the adhesive layer 3 is formed by extrusion laminating,
15 which requires melting at high temperature, an alicyclic saturated petroleum resin is particularly preferred from the standpoint of stability to oxidation.

The incorporation of an alicyclic saturated hydrocarbon-based resin as a tackifying resin in the adhesive
20 layer 3 makes it possible to improve efficiency in taping and allow the bottom cover tape to exhibit a stable and good adhesivity to carrier tape.

The amount of the alicyclic saturated hydrocarbon-based resin to be incorporated in the adhesive layer is, e.g., from
25 about 1 to 50 parts by weight, preferably from about 5 to 30

parts by weight based on 100 parts by weight of the base polymer. When the amount of the alicyclic saturated hydrocarbon-based resin falls below 1 parts by weight based on 100 parts by weight of the base polymer, the molten adhesive composition cannot
5 adhere to the supporting base material 2 (no anchor effect can be obtained), if it is paper, making it necessary that co-extrusion or tandem extrusion laminating be effected rather than mere extrusion laminating to form an interlayer. Further, the resulting bottom cover tape can hardly be provided with
10 a desired adhesivity to carrier tape (paper carrier).

On the contrary, when the amount of the alicyclic saturated hydrocarbon-based resin exceeds 50 parts by weight based on 100 parts by weight of the base polymer, blocking can occur between the adhesive layer 3 and the metallic roll provided
15 in contact with the adhesive layer 3 shortly after extrusion during film forming, disabling stable production. Further, chip parts can adhere to the adhesive layer 23, making it difficult for them to be sucked by air nozzle at the step of producing circuit board.

20 (Amphoteric surface active agent, nonionic surface active agent)

As the amphoteric surface active agent and/or nonionic surface active agent to be incorporated in the adhesive layer 3 there may be used one free of halogen atom and sulfur atom.
25 The use of such a surface active agent free of halogen atom

polyoxy propylene block copolymer, polyethylene glycolaliphatic acid ester (polyoxyethylenealiphatic acid ester), polyoxyethylene sorbitanaliphatic acid ester, and aliphatic acid alkanolamide.

5 These amphoteric surface active agents and/or nonionic surface active agents may be used singly or in admixture of two or more thereof.

 The amount of the surface active agent (amphoteric surface active agent and/or nonionic surface active agent) to be
10 incorporated in the adhesive layer is from 0.1 to 20 parts by weight, preferably from 0.5 to 10 parts by weight based on 100 parts by weight of the base polymer as calculated in terms of effective component or solid content. When the amount of the surface active agent to be incorporated falls below 0.1 parts
15 by weight based on 100 parts by weight of the base polymer, the resulting antistatic properties are deteriorated, occasionally causing electrostaticity that causes chip parts to adhere to the surface of the adhesive layer and making it impossible to exert a sufficient antistatic effect. In some
20 detail, when the amount of the surface active agent to be incorporated in the adhesive layer falls below 0.1 parts by weight based on 100 parts by weight of the base polymer, the surface resistivity of the adhesive layer can exceed 1×10^{13} Ω /square (ohm per square) and the triboelectricity of the
25 adhesive layer can exceed 3,000 V. On the contrary, when the

amount of the surface active agent to be incorporated in the adhesive layer exceeds 20 parts by weight based on 100 parts by weight of the base polymer, the surface active agent bleeds out to the surface or interface of the adhesive layer, making it impossible to obtain a sufficient adhesivity to the adherend (carrier tape). Further, the resulting adhesive layer exhibits an insufficient adhesivity to the supporting base material layer 2, occasionally causing the destruction of interface of the adhesive layer 3 with the supporting base material layer 2.

In the invention, the adhesive layer 3 may comprise additives such as filler, oxidation inhibitor, softening agent, ultraviolet absorber, rust preventive, coupling agent, antistat other than those described above and crosslinking agent incorporated therein.

The thickness of the adhesive layer 3 may be properly predetermined so far as the adhesivity and handleability thereof cannot be impaired. In practice, however, it is from about 5 μm to 50 μm . When the thickness of the adhesive layer 3 falls below 5 μm , the resulting adhesive layer exhibits a deteriorated adhesivity to carrier tape (adherend) and can be difficultly worked. On the contrary, when the thickness of the adhesive layer 3 exceeds 50 μm , the resulting bottom cover tape exhibits too great a total thickness that brings about a problem of deterioration of handleability or production efficiency due to weight increase caused when it is produced in continuous

length.

In the invention, the softening point of the adhesive layer 3 is preferably from about 60°C to 170°C (more preferably from about 70°C to 150°C). When the softening point of the adhesive layer 3 falls below 60°C, an electronic part having chip parts encapsulated therein to be conveyed is subject to adhesion or bonding of the chip parts to the adhesive layer 3 when exposed to high temperature and humidity atmosphere over an extended period of time. On the contrary, when the softening point of the adhesive layer 3 exceeds 170°C, film forming requires raised temperature that deteriorates heat sealing (taping) efficiency and vaporizes the surface active agent (amphoteric surface active agent and/or nonionic surface active agent) incorporated in the adhesive layer 3 to lessen the antistatic effect.

The softening point of the adhesive layer 3 can be adjusted by properly predetermining the kind of the base polymer (e.g., thermoplastic resin, thermoplastic elastomer) constituting the adhesive layer 3 or other factors.

The surface resistivity of the adhesive layer 3 is preferably from 10^8 to 10^{13} Ω /square (more preferably from 10^8 to 10^{12} Ω /square). The surface resistivity of the adhesive layer 3 can be adjusted by properly predetermining the kind and mixing proportion of the resin constituting the adhesive layer 3, additives such as surface active agent (antistat) to be

incorporated therein, etc.

The triboelectricity of the adhesive layer 3 is preferably not higher than 3,000 V (particularly not higher than 1,000 V). The triboelectric voltage of the adhesive layer 3 can be
5 adjusted by properly predetermining the kind of the thermoplastic adhesive to be incorporated in the adhesive layer 3, thickness of the adhesive layer 3, etc.

In the invention, the surface roughness (average roughness Ra) of the adhesive layer 3 is preferably from 0.1
10 μm to 20 μm (more preferably from 1 μm to 18 μm). When the surface roughness of the adhesive layer 3 falls below 0.1 μm , the resulting adhesive layer has an increased contact area with chip parts, raising the adhesivity of the adhesive layer to chip parts and making it easier for chip parts to adhere to
15 the adhesive layer. On the contrary, when the surface roughness of the adhesive layer 3 exceeds 20 μm , a problem can arise that the adhesive layer cracks during film forming or the adhesivity to carrier tape (adherend) drops.

In the invention, an interlayer may be provided interposed
20 between the supporting base material layer 2 and the adhesive layer 3 to enhance the adhesivity therebetween. The interlayer may be formed by a thermoplastic resin such as polyolefin resin, thermoplastic elastomer, rubber or the like. Examples of the olefin-based resin include low density polyethylene, linear
25 low density polyethylene, ethylene- α -olefin copolymer, and

ethylene-vinyl acetate copolymer. These components constituting the interlayer may be used singly or in admixture of two or more thereof. The thickness of the interlayer can be properly predetermined so far as the handleability of the bottom cover tape or the like cannot be impaired and is, e.g.,
5 from about 0 μm to 40 μm . The interlayer doesn't necessarily need to be provided.

The bottom cover tape 1 of the invention can be prepared, e.g., by a process which comprises melt-blending the constituent components of the adhesive layer 3 in a predetermined proportion
10 by a twin-screw kneader and pelletizing the blend or dry-blending the constituent components in the same manner, and then laminating the pelletized blend or dry-blend on the supporting base material layer 2 with the interposition or free of an
15 interlayer by an ordinary single or tandem extrusion laminating method. Alternatively, the adhesive layer 3 and the interlayer may be co-extruded and laminated on the supporting base material layer 2 to prepare the bottom cover tape 1.

Fig. 2 is a schematic longitudinal sectional view of carrier material for chip type electronic part comprising the
20 bottom cover tape 1 shown in Fig. 1 in use. The carrier material 4 for chip type electronic part comprises a carrier tape 5 having rectangular holes 7 for receiving a chip type electronic part punched therein at a constant interval, a bottom cover tape
25 1 provided at the lower surface of the carrier tape 5, and a

top cover tape 6 provided on the upper surface of the carrier tape 5. The carrier material 4 is heat-sealed with the bottom cover tape 1 at the lower surface of the carrier tape 5 to form receiving pockets therein. Chip type electronic parts 8 each
5 are received in the respective receiving pockets. The carrier tape 5 is then heat-sealed with the top cover tape 6 on the upper surface thereof. The carrier tape 5 is then wound on a reel for transportation.

Since the adhesive layer 3 of the bottom cover tape 1
10 is formed by a resin composition comprising a base polymer, a specific tackifier and a specific antistat (surface active agent) in a specific proportion, the bottom cover tape 1 and the carrier tape 5 can be firmly bonded to each other, making it possible to prevent the bottom cover tape 1 from being peeled
15 off the carrier tape 5 and hence causing the chip parts 8 to drop during conveyance.

The bottom cover tape 1 also exhibits excellent antistatic properties and hence can fairly prevent chip parts from adhering thereto. In some detail, the bottom cover tape 1 can inhibit
20 or prevent the adhesion of chip parts 8 to the surface of the adhesive layer 3 thereof. The bottom cover tape 1 can also inhibit or prevent the adhesion or fusion of chip parts 8 to the surface of the adhesive layer 3 thereof even during storage after reception or encapsulation of chip parts 8.

25 In this arrangement, the efficiency of sucking of chip

parts by the air nozzle in the automatic assembly system can be remarkably enhanced, assuring that the chip parts can be withdrawn from the carrier tape and supplied onto the board.

Further, since the adhesive layer 3 is free of any components (e.g., halogen ion such as chlorine ion, sulfur compoundsuch as sulfate ion), the bottom cover tape 1 can inhibit or prevent the corrosion of chip parts 8 and thus exhibits excellent corrosion-inhibiting properties with respect to chip parts. Accordingly, the bottom cover tape 1 can act as an electronic part conveying material which enhances the reliability during packaging and storage.

The bottom cover tape thus obtained can be fairly used to convey chip type electronic parts such as chip fixed resistor and laminated ceramic capacitor.

The bottom cover tape of the invention comprises an adhesive layer formed by specific components and thus exhibits excellent thermal adhesion properties with respect to carrier tape. The bottom cover tape of the invention also exhibits excellent antistatic properties. Thus, the bottom cover tape of the invention produces an extremely low triboelectric voltage during conveyance or the like, making it possible to inhibit or prevent the electrostatic attraction of chip parts to the surface of the adhesive layer. Therefore, the bottom cover tape of the invention exhibits excellent anti-blocking properties with respect to chip parts. Further, since the

bottom cover tape of the invention comprises an antistat free of halogen atom or sulfur atom, the electrode in chip parts cannot be corroded.

Accordingly, defects such as electrostatic attraction
5 or repulsion of chip parts and adhesion of chip parts caused by holding chip parts by the air nozzle during transportation, peeling or the like can be eliminated, making it possible to eliminate missuction of chip parts by the air nozzle and hence supply chip parts smoothly onto board in the automatic assembly
10 system.

The present invention will be further described in the following examples, but the present invention should not be construed as being limited thereto.

EXAMPLE 1

15 100 parts by weight of a low density polyethylene (LDPE) (base polymer by trade name "LJ800", produced by MITSUBISHI CHEMICAL CORPORATION; density: 0.918 g/cm³; melt flow rate (MFR): 20 g/10 min.; softening point: 82°C), 20 parts by weight of an alicyclic hydrocarbon-based resin (tackifying resin by
20 trade name "ESCOREZ5300", produced by Exxon Mobil Corporation) and 1.5 parts by weight of a nonionic surface active agent (antistat (polyoxyethylenealiphatic acid ester) by trade name "Nonion S-10", produced by NOF CORPORATION) were kneaded at a temperature of 130°C for 30 minutes by a twin-screw kneader,
25 and then pelletized. Subsequently, the pelletized blend was

extruded at a temperature of 250°C through an extrusion laminator to form a film which was then laminated on a Japanese paper (thickness: 40 μm ; basis weight: 19 g/m²) as a supporting base material. An adhesive layer was then laminated on the Japanese paper to a thickness of 25 μm to obtain a laminated tape (bottom cover tape). The laminated tape thus obtained had a total thickness of 55 μm and a surface roughness Ra of 4 μm on the adhesive layer thereof.

EXAMPLE 2

100 parts by weight of an ethylene-vinyl acetate copolymer (EVA resin) (base polymer by trade name "LV140", produced by MITSUBISHI CHEMICAL CORPORATION; vinyl acetate content: 2% by weight; MFR: 1.5 g/10 min.; softening point: 87°C), 10 parts by weight of an alicyclic hydrocarbon-based resin (tackifying resin by trade name "ESCOREZ5380", produced by Exxon Mobil Corporation) and 5 parts by weight of a nonionic surface active agent (trade name "AIMEX 300-LD", produced by Sanyo Chemical Industries, Ltd.) were pelletized in the same manner as in Example 1. Subsequently, the pelletized blend was extruded at a temperature of 220°C through an extrusion laminator to form a film which was then laminated on a Japanese paper (thickness: 40 μm ; basis weight: 18 g/m²) as a supporting base material. An adhesive layer was then laminated on the Japanese paper to a thickness of 20 μm to obtain a laminated tape (bottom cover tape) having a total thickness of 50 μm . Thereafter,

the laminated tape was sandblasted such that the surface roughness Ra of the adhesive layer was 15 μm .

EXAMPLE 3

100 parts by weight of a low density polyethylene (LDPE)
5 (base polymer by trade name "LJ800", produced by MITSUBISHI
CHEMICAL CORPORATION; density: 0.918 g/cm³; melt flow rate
(MFR): 20 g/10 min.; softening point: 82°C), 20 parts by weight
of an alicyclic hydrocarbon-based resin (tackifying resin by
trade name "ESCOREZ5300", produced by Exxon Mobil Corporation)
10 and 2 parts by weight of a polyethylene glycol (antistat;
nonionic surface active agent) were kneaded by a Banbury mixer,
and then pelletized. Subsequently, the pelletized blend was
extruded at a temperature of 250°C through an extrusion laminator
to form a film which was then laminated on a Japanese paper
15 (thickness: 25 μm ; basis weight: 14 g/m²) as a supporting base
material. An adhesive layer was then laminated on the Japanese
paper to a thickness of 25 μm to obtain a laminated tape (bottom
cover tape). The laminated tape thus obtained had a total
thickness of 50 μm and a surface roughness Ra of 3 μm on the
20 adhesive layer thereof.

COMPARATIVE EXAMPLE 1

Onto a Japanese paper (thickness: 40 μm ; basis weight:
18 g/m²) as a supporting base material layer was laminated a
low density polyethylene (by trade name "LJ800", produced by
25 MITSUBISHI CHEMICAL CORPORATION; density: 0.918 g/cm³; MFR:

20 g/10 min.; softening point: 82°C) through an extrusion laminator to obtain a laminated tape having a total thickness of 55 μm and a surface roughness Ra of 0.05 μm on the adhesive layer thereof.

5 COMPARATIVE EXAMPLE 2

To 100 parts by weight of a straight-chain low density polyethylene (by trade name "UF240", produced by MITSUBISHI CHEMICAL CORPORATION; density: 0.923 g/cm³; MFR: 2 g/10 min.; softening point: 85°C) were added 5 parts by weight of a
10 quaternary ammonium salt (cationic antistat). The mixture was kneaded by a kneader, and then extrusion-laminated onto a Japanese paper (thickness: 35 μm ; basis weight: 15 g/m²) as a supporting base material layer through an extrusion laminator to obtain a laminated tape having a total thickness of 50 μm
15 and a surface roughness Ra of 0.5 μm on the adhesive layer thereof.
Evaluation test

The laminated tapes thus obtained in the examples and comparative examples were each subjected to the following tests. The results are forth in Table 1.

20 (Tensile strength and elongation)

Using a tensilometer, the laminated tape was measured for tensile strength (N/5.25 mm) and elongation (N/5.25 mm) at a pulling rate of 300 mm/min.

(Adhesivity)

25 The laminated tape was heat-sealed to the surface of a

paper carrier (HOCTO-60, produced by HOKUETU PAPER MILLS, LTD.)
by a heat sealer (taping machine produced by Tokyo Weld Co.,
Ltd.) at a temperature of 170°C, an iron holding force of 1.5
kgf (14.7 N) and 1,200 PCS/min. Using a peel testing machine,
5 the laminated tape was measured for adhesivity (adhesive force)
(N/5.25 mm) at a peel rate of 300 mm/min and a peel angle of
180°.

(Surface resistivity)

Using a high resistivity meter Hirestor UP (produced by
10 MITSUBISHI CHEMICAL CORPORATION), the various laminated tapes
were each measured for surface resistivity (Ω) in an atmosphere
of 23°C and 65%RH and 500 V in 30 seconds.

(Triboelectric voltage)

The various laminated tapes were each measured for
15 triboelectric voltage (V) on the adhesive layer side thereof
according to JIS L 1094.

(Corrosion-inhibiting properties)

The various laminated tapes were each thermally
contact-bonded to a nickel foil (Ni foil) on the adhesive layer
20 side thereof. The laminate Ni foil was then stored in an
atmosphere of 60°C and 90%RH for 100 hours. The laminated tape
was then peeled off the Ni foil. The Ni foil was then examined
for degree of discoloration. Those showing no discoloration
were judged "G (good)". Those showing discoloration at some
25 area were judged "F (fair)". Those showing discoloration at

entire surface were judged "P (poor)".

(Ion extract)

The material of the adhesive layer of the various laminated tapes were each dipped in 50 ml of purified water in pelletized form. The pelletized material was then boiled at a temperature of 100°C under reflux for 45 minutes to extract ion components. The extract thus obtained was cooled, and then subjected to ion chromatography to determine the detected amount (extracted amount) (ppm) of chlorine ion (Cl^-) and sulfate ion (SO_4^{2-}) contained therein. In Table 1 below, "ND" stands for "not detected".

Table 1

	Example No.			Comparative Example No.	
	1	2	3	1	2
Tensile strength (N/5.25 mm)	10	11	10	10	8
Elongation (N/5.25 mm)	3	2	3	2	1.5
Adhesivity (N/5.25 mm)	300 <	150	250 <	200 <	120
Surface resistivity (Ω)	1×10^{10}	5×10^8	3×10^8	$1 \times 10^{14} <$	1×10^9
Triboelectric voltage (V)	170	100	35	3,200	15
Corrosion-inhibiting properties	G	G	G	G	F ~ P
Ion extract					
Chlorine ion (ppm)	ND	ND	ND	ND	28
Sulfate ion (ppm)	ND	ND	ND	ND	4

As can be seen in Table 1 above, the bottom cover tapes according to the examples exhibit a good adhesivity to carrier tape. The bottom cover tapes of the examples generate a low

triboelectric voltage and exhibit a low surface resistivity on the adhesive layer thereof. Therefore, the bottom cover tapes of the examples exhibit excellent antistatic properties and hence can inhibit or prevent the adhesion of chips thereto.

5 Further, the adhesive layer which comes in contact with chip parts is free of chlorine ion or sulfate ion and thus doesn't corrode Ni. Accordingly, the bottom cover tapes of the examples are excellent in corrosion-inhibiting properties as well.

This application is based on Japanese patent application
10 JP 2001-003710, filed January 11, 2001, the entire content of which is hereby incorporated by reference, the same as if set forth at length.

What is claimed is:

1. A bottom cover tape for electronic part carrier, which comprises: a supporting base material layer; and an adhesive layer, wherein the adhesive layer contains: 100 parts by weight of a base polymer; 1 to 50 parts by weight of an alicyclic saturated hydrocarbon resin; and 0.1 to 20 parts by weight of at least one of an amphotoeric surface active agent free of halogen atom and sulfur atom and a nonionic surface active agent free of halogen atom and sulfur atom.

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2. The bottom cover tape for electronic part carrier according to Claim 1, wherein the adhesive layer has a thickness of from 5 μm to 50 μm , a softening point of from 60°C to 170°C and a surface resistivity of from 10^8 to 10^{13} Ω/square .

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3. The bottom cover tape for electronic part carrier according to Claim 1, wherein the adhesive layer has a surface roughness of from 0.1 μm to 20 μm .

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4. The bottom cover tape for electronic part carrier according to Claim 2, wherein the adhesive layer has a surface roughness of from 0.1 μm to 20 μm .

25

5. The bottom cover tape for electronic part carrier according to Claim 1, wherein the adhesive layer exhibits a

triboelectric voltage of not greater than 3,000 V.

6. The bottom cover tape for electronic part carrier according to Claim 2, wherein the adhesive layer exhibits a
5 triboelectric voltage of not greater than 3,000 V.

7. The bottom cover tape for electronic part carrier according to Claim 3, wherein the adhesive layer exhibits a triboelectric voltage of not greater than 3,000 V.

10

8. The bottom cover tape for electronic part carrier according to Claim 4, wherein the adhesive layer exhibits a triboelectric voltage of not greater than 3,000 V.