

Description

This invention relates to a printed wiring board used for mounting electronic parts such as various kinds of chips and semiconductor elements, and a process for producing such a printed wiring board.

Especially, the present invention is intended to provide a printed wiring board having excellent characteristics for dispersing heat generated from the mounted electronic parts and which also is substantially moisture-proof, and a process for producing such a printed wiring board.

Conventional printed wiring boards designed for directly mounting electronic parts are generally used as circuit boards for timepieces, cameras and such. Use of such boards has the merit of allowing a reduction of size and thickness of the articles manufactured by using such boards.

Plastics and/or ceramics are used as materials of which these printed wiring boards are made, plastic being the most widely used. Generally, printed wiring boards made of plastic can be made to precise dimensions and are stronger with respect to mechanical shock than those made of ceramic material such as alumina. However, the thermal conductivity of plastic is very low, about 1/60 of that of alumina ceramic, and for this reason, conventional plastic boards are still unsatisfactory for practical use as a board for mounting IC's with a large scale of integration or electronic parts requiring high power.

In order to overcome this problem, various proposals, such as mentioned below, have been made on the type of printed wiring board, known e.g. from CH-A-638 947, in which a metal plate of high thermal conductivity is bonded through an adhesive layer to the plastic board and electronic parts are directly mounted in an opening on such metal plate for better heat dispersion.

This applicant has previously disclosed a printed wiring board for mounting semiconductors and IC chips in Japanese Utility Model Laid-Open No. 100060/79. In this disclosed printed wiring board, a recess of a specified depth is provided at the part of the board where semiconductors and IC chips are to be mounted, and in said recess is further provided a through-hole of a specific configuration, with the region around said through-hole being designed to constitute a supporting region on which a thin metal sheet is seated for carrying thereon semiconductors and IC chips. This printed wiring board, however, had the problem that in the manufacture of this board, if the horizontal sectional area of the recess is increased, the space allowed for circuit arrangement on the board surface is accordingly decreased; therefore, it is necessary to enlarge the planar area of the printed wiring board itself to accommodate high-density wiring, while if the horizontal sectional area of said recess is small, the area of the supporting region decreases correspondingly so as to adversely affect adhesion between the metal sheet and the supporting

region. Further, extremely high accuracy is required for working the inner peripheral surface of the recess and metal sheet for tightly fitting the metal sheet to the inner peripheral surface of said recess. It increases the cost of working and reduces productivity. There was also the problem of the reduced working life of electronic parts, as the penetration of atmospheric moisture into electrical components mounted on the metal sheet in said recess could not be prevented.

Japanese Utility Model Laid-Open No. 172970/81 discloses a circuit board for timepieces incorporating a laminated reinforcing material such as metal or ceramic, in which the recess for mounting LSI is formed after said reinforcement has been laminated to the circuit board. This device, however, will not prevent penetration of moisture into the LSI mounted in the recess through the adhesive layer bonding the board and reinforcement, thereby resulting in a reduced life of the LSI.

Japanese Patent Laid-Open No. 166056/82 discloses an integrated module principally composed of a printed wiring board and logical units, that is, chips fixed thereon, in which a single-layer or multi-layer supporting base is provided with an opening into which a stepped region of a heat dissipator correctly joined to said supporting base extends, and on the side opposite from said supporting base, said logical units are directly secured on said stepped portion of the heat dissipator by a medium having high thermal conductivity. In this integrated module, however, since the stepped portion of the heat dissipator is joined to the opening of the printed wiring board, atmospheric moisture is liable to reach the logical units through said joint, so that said logical units tend to suffer early failure and have a short service life.

It is therefore desirable to provide a printed wiring board for mounting electronic parts which is free of said disadvantages of the prior art, has excellent heat dispersion characteristics, moisture resistance and high reliability and which is readily adaptable to high-density wiring, and a process for producing such printed wiring board.

According to one aspect of the present invention, there is provided a printed wiring board for mounting electronic parts, the board comprising a plastic material formed with a through opening in the region where electronic parts are to be mounted, and a metal sheet bonded through an adhesive layer to the rear of the board at least at its area surrounding the end of said opening on the rear of said board, the end of said opening on the rear of said board being closed by said metal sheet, characterised by:

an integral coating film formed by plating on the inside wall of said opening, the lateral face of the adhesive layer exposed to said opening and the opening bottom-forming face of the metal sheet closing the end of the opening on the rear side of said board, and

an integral coating film formed by plating at least the area on the rear side of the board

surrounding the area where said metal is bonded, the outer peripheral face of said adhesive layer, and the lateral side and underside surface of said metal sheet.

Further aspects of the present invention provide processes for producing a printed wiring board according to the accompanying claims 5 and 6.

Reference is made, by way of example, to the accompanying drawings in which:—

Figs. 1 to 3 are vertical sectional views showing the structural setup in the embodiments of the printed wiring board for mounting electronic parts in accordance with the present invention.

Figs. 4 (a), (b), (c) and (d) are plane views showing the configurations of metal sheets specifically designed for secure positioning thereof in the printed wiring board of this invention and the configurations of the recession formed on the rear side of the board.

Figs. 5 and 6 are vertical sectional views showing the sequential steps of the production process for said embodiments of the printed wiring board according to this invention.

Fig. 7 is a perspective view of a pin grid array package manufactured by using the board for mounting electronic parts according to this invention as it was seen from the back of the board.

Fig. 8 is a longitudinal sectional view taken along the line A—A of Fig. 7.

Referring first to Fig. 1, there is shown a vertical sectional view of a printed wiring board comprising a plastic material embodying the invention, the figure being intended to show an opening 3 formed therein for mounting electronic parts and the structural setup around said opening. Both upper and lower surfaces of base board 1 are covered with a metal foil 2. A metal sheet 5 is bonded through an adhesive layer 7 to the region surrounding the lower end of said opening 3 on the lower side, that is, rear side of said board 1. The underside of said metal sheet 5 and the area on the rear side of the base board outside the reach of said metal sheet 5 are coated with an integral film 9 formed by plating. A plated integral coating film 11 is also formed on the side wall of said opening 3 and its bottom region formed by said metal sheet 5.

A laminated plate of plastic material and glass cloth or paper is generally used as the wiring board, and a resin selected from epoxy resin, polyimide resin, triazine resin and phenolic resin or a mixture thereof is used as the plastic material. Such conventional boards containing plastic material are usable in this invention. However, said plastic material 1 and adhesive layer 7 have the property of absorbing moisture and allowing its penetration, so that with conventional boards having no integral coating film plated thereon, ambient moisture cannot be prevented from entering the opening through said plastic material and adhesive layer, while heat generated by the operation of said electronic parts can be well dispersed through the metal

sheet because the electronic parts are directly mounted on the metal sheet at the bottom of the opening.

As described above, in the wiring board according to this invention the adhesive layer 7 is sealed off from the ambient atmosphere by plating film 9 and the inside of the opening 3 is isolated from plastic material 1 and adhesive layer 7 by plating film 11, so that when electronic parts are mounted and functioning ambient moisture does not enter said opening 3.

Figs. 2 and 3 illustrate in vertical section the structure of other embodiments of a printed wiring board according to this invention. In these embodiments, unlike that of Fig. 1, the rear side of board 1 is recessed and a metal sheet 5 is bonded to the inside surface of the recess, that is, to the stepped region 13 formed by the recess, through an adhesive layer 7.

In the board illustrated in Fig. 2, the clearance between metal sheet 5 and side wall of the recess is smaller than that in the board shown in Fig. 3, so that the plating film 9 formed integrally on the rear side surfaces of said board 1 and metal sheet 5 is slightly indented, as shown by 15, at the part corresponding to the location of said clearance. In the board illustrated in Fig. 3, because the clearance between metal sheet 5 and side wall of the recession is large, there still remains a space 12 at the side wall of the recess, the lateral and rear side faces of metal sheet 5 and the bottom portion of clearance have been plated to form an integral coating film 9. In these board embodiments formed with an indentation 15 shown in Fig. 2 or a space 12 shown in Fig. 3, the board of Fig. 3 has even better heat dispersion characteristics because of the greater area of the plating film on the rear side of board. Therefore, in the embodiments of the wiring board illustrated in Figs. 2 and 3, in which integral plating films 9, 11 are provided as in the board of Fig. 1, ambient atmospheric moisture penetration into the opening 3 is completely prevented when electronic parts are mounted therein and operated, and also good heat dispersion characteristics are provided as in the conventional boards.

Figs. 4 (a), (b), (c) and (d) are plane views showing various embodiments of metal sheet arrangement in the wiring boards of the structures shown in Figs. 2 and 3. It will be seen that deformed regions or protuberances 14 are provided at the lateral side of metal sheet 5 and/or the inner side of the recess for properly positioning the metal sheet in the recess for bonding it to the bottom of said recess provided on the rear side of the board and for preventing the metal sheet from being dislocated by vibration or impact force when electronic parts are mounted and are functioning. In the embodiments of Figs. 4 (a) and (b), metal sheet 5 is provided with protuberances 14 at the four corners or at the four sides, whereby metal sheet 5 can be very easily and securely positioned and bonded to the bottom of the recess. In the embodiments of

Figs. 4 (c) and (d), deformed portions or protuberances 14 are provided at the inside wall of the recess, whereby the same effect as in the embodiments of (a) and (b) can be obtained.

The adhesive or bonding agent used for the board of this invention is selected from epoxy resin, polyimide resin, acrylic resin, triazine resin and modified resins thereof. These resins can be advantageously used for the purpose of this invention because of their excellent adhesiveness, heat resistance, durability and electrical insulating properties. For the metal sheet, metal materials having relatively high thermal conductivity such as copper, copper alloy, iron, iron alloy, aluminum and aluminum alloy can be advantageously used. Copper, nickel, gold, tin and the like can be used for plating.

Next, the process for producing the printed wiring board for mounting electronic parts embodying this invention is described with reference to the accompanying drawings.

Figs. 5 (a) to (d) illustrate in steps the process for producing a board by showing the board structure in vertical section. As shown in (a), metal foil 2 is attached to both upper and lower surfaces of base board 1 and a through-opening 3 is formed in said base board 1 by punching or cutting. Then metal sheet 5 is bonded to the area around the end of said opening on the metal foil 2 of the rear side of the board through a medium of adhesive layer 7 on the metal foil 2 as shown in (b). Next, as illustrated in (c), the inside wall of said opening 3, the lateral face of adhesive layer 7 exposed to said opening 3, the inside face of metal sheet 5 forming the bottom of said opening and the front side surface of base board 1 are plated to form an integral coating film 11. The same plating is also made on the rear surface of base board 1, the outer surface of metal sheet 5 and the externally exposed part of adhesive layer 7 to form an integral film 9. Thereby the objective board of the present invention can be obtained. Fig. 5 (d) illustrates an embodiment of a printed wiring board as obtained by other processes, such as stated below, on the board shown in (c). For instance, the surface of the board shown in (c) is coated with a photosensitive resin film and then a conductive circuit is formed, in the usual way, by etching after a desired circuit pattern of photo sensitive film is formed thereon. After such final processing, electronic parts such as semiconductor elements are mounted in the opening 3 and fixed in position with the aid of a silver paste or other means.

Figs. 6 (a) to (e) show the sequential steps of the process for producing another embodiment of printed wiring board according to this invention. Fig. 6 (a) illustrates in vertical section the base board 1 applied with metal foil 2 on both upper and lower surfaces thereof and formed with a recess 17 on the rear side of the board by using an end mill. Then, in (b), metal sheet 5 is bonded to the bottom of said recess 17 through an adhesive layer 7. Then the front side of board 1 is machined by an end mill to form an opening 3 to a depth

which reaches at least said metal sheet 5 as shown in (c). Then, as illustrated in (d), an integral coating film 11 is formed by plating on the side wall of said opening 3, the metal sheet face forming the bottom of said opening 3 and the metal foil 2 on the board surface while also forming a similar film 9 on the rear side surface of the board, the side wall and bottom of clearance between board and metal sheet and the underside surface of metal sheet, thereby constituting a desired wiring board. Fig. 6 (e) shows an embodiment of the finished board structure as obtained by applying a photosensitive resin film on the surface of the board shown in (d), forming a desired circuit pattern thereon, etching the same and forming a conductor circuit in the usual way. After such finishing work has been completed, electronic parts such as semiconductor elements are mounted in the opening 3 and fixed in position with a silver paste or other means.

Fig. 7 is a perspective view of a pin grid array package manufactured by using a board for mounting electronic parts embodying this invention as seen from the rear side of the board, and Fig. 8 is a vertical sectional view taken along the line A—A of Fig. 7. In this package, LSI chip 19 is mounted in the opening 3 of the printed wiring board 1 of this invention and the region around said LSI chip 19 is covered with epoxy resin 22. Conductor pins 21 for connection to other units extend from the side opposite metal sheet 5, said pins being secured in through-holes 23 which are electrically conductive with the circuit.

As described above, in the printed wiring board for mounting electronic parts according to this invention, electronic parts such as semiconductor elements are securely bonded to a metal sheet having high thermal conductivity, through a plating film, so that the heat generated from the mounted electronic parts is quickly and positively absorbed and dispersed. Further, since the inside of the opening of the board as well as the rear side surfaces of board and metal sheet and in some cases the clearance between recess and metal sheet are coated with an integral plating film, it is possible to completely prevent penetration of ambient atmospheric moisture into the opening through the plastic material and the adhesive layer. Moreover, on the board in which the metal sheet is adapted in a recess formed on the rear side of the board, said metal sheet can be so set that its underside does not bulge greatly from the rear plane of the board or is flush with said plane, so that a thinner board can be provided.

The board for mounting electronic parts according to this invention can be advantageously used as, for instance, an built-in printed wiring board for cameras, timepieces, etc., and a board for mounting semiconductor elements such as a chip carrier, a pin grid array package, a hybrid circuit board and the like.

Claims

1. A printed wiring board for mounting electronic parts, the board comprising a plastic material (1) formed with a through opening (3) in the region where electronic parts are to be mounted, and a metal sheet (5) bonded through an adhesive layer (7) to the rear of the board at least at its area surrounding the end of said opening on the rear of said board, the end of said opening (3) on the rear of said board being closed by said metal sheet, characterised by:

an integral coating film (11) formed by plating on the inside wall of said opening, the lateral face of the adhesive layer (7) exposed to said opening (3) and the opening bottom-forming face of the metal sheet (5) closing the end of the opening on the rear side of said board, and

an integral coating film (9) forming plating at least the area on the rear side of the board surrounding the area where said metal is bonded, the outer peripheral face of said adhesive layer (7), and the lateral side and underside surface of said metal sheet (5).

2. A board according to claim 1, wherein the area surrounding the end of said opening on the rear side of the board has a recess so as to form a stepped portion (13) constituting the bottom of said opening, said metal sheet (5) being bonded through said adhesive layer (7) to said stepped portion (13) formed by said recess.

3. A board according to claim 2, wherein a recessed clearance (12) is formed between an inner peripheral face of said recess and the opposing outer peripheral face of the metal sheet (5).

4. A board according to claim 3, wherein the metal sheet (5) is positioned on the stepped portion (13) in said recess so that the outer peripheral face of the metal sheet and the inner peripheral face of said recess contact each other at a number of sections whereby said recessed clearance maintains a predetermined spacing.

5. A process for producing a printed wiring board for mounting electronic parts, comprising a sequence of the following steps (a) to (d):

(a) forming a through opening in that region of a printed wiring board containing a plastic material where electronic parts are to be mounted;

(b) bonding a metal sheet through an adhesive layer to the area surrounding the end of said opening on the rear side of the board;

(c) plating the external surface of the board including the metal sheet, the inside wall of said opening, the lateral face of the adhesive layer exposed to said opening, and the outer peripheral face of said adhesive layer; and

(d) forming a circuit in the usual way on the board manufactured through said steps.

6. A process for producing a printed wiring board for mounting electronic parts comprising a sequence of the following steps (a) to (e);

(a) forming a recess on the rear side of the specific region of a printed wiring board contain-

ing a plastic material where electronic parts are to be mounted;

(b) bonding a metal sheet through an adhesive layer to the bottom of said recess;

(c) forming an opening in said specific region on the front of said board so that said opening will extend to at least said metal sheet;

(d) plating the external surface of the board including said metal sheet, the inside wall of said opening, the lateral face of the adhesive layer exposed to said opening, and the outer peripheral face of said adhesive layer; and

(e) forming a circuit in the usual way on the board manufactured through said steps.

7. A process according to claim 6, wherein in step (b) the metal sheet is bonded to the bottom of said recess in such a manner that a recessed groove having a predetermined clearance will be formed between an outer peripheral face of said metal sheet and an opposing inner peripheral face of said recess.

8. A process according to claim 7, wherein in step (b) the metal sheet is bonded by positioning it on the stepped portion in said recess so that the inner peripheral face of said recess and the opposing outer peripheral face of said metal sheet will contact each other at a number of sections whereby said recessed groove will maintain the predetermined clearance.

Patentansprüche

1. Gedruckte Schaltungsplatte zum Befestigen elektronischer Teile, wobei die Platte ein Plastikmaterial (1), das mit einer durchgehenden Öffnung (3); in dem Bereich versehen ist, in dem die elektronischen Teile zu befestigen sind, und ein Metallblech (5) aufweist, das mittels einer Haftschrift (7) wenigstens auf der das Ende der Öffnung auf der Rückseite der Platte umgebenden Fläche mit der Rückseite der Platte verbondet ist, wobei das Ende der Öffnung (3) auf der Rückseite der Platte durch das Metallblech verschlossen ist, gekennzeichnet durch

einen einstückigen Beschichtungsfilm (11), der durch Plattieren auf der Innenwand der Öffnung, der der Öffnung (3) zugewandten Seitenfläche der Haftschrift (7) und der der Öffnungsboden bildenden Fläche des Metallblechs (5), welches das Ende der Öffnung auf der Rückseite der Platte verschließt, gebildet ist, und

einen einstückigen Beschichtungsfilm (9), der durch Plattieren wenigstens der Fläche auf der Rückseite der Platte, welche denjenigen Bereich umgibt, in dem das Metall verbondet ist, der äußeren Umfangsfläche der Haftschrift (7), der Seite und der Unterseite des Metallblechs (5) gebildet ist.

2. Platte nach Anspruch 1, bei der die das Ende der Öffnung auf der Rückseite der Platte umgebende Fläche eine Ausnehmung aufweist, um einen gestuften Bereich (13) zu bilden, welcher den Boden der Öffnung bildet, wobei das Metallblech (5) über die Haftschrift (7) mit dem durch die Ausnehmung gebildeten gestuften Bereich (13) verbondet ist.

Claims

1. A printed wiring board for mounting electronic parts, the board comprising a plastic material (1) formed with a through opening (3) in the region where electronic parts are to be mounted, and a metal sheet (5) bonded through an adhesive layer (7) to the rear of the board at least at its area surrounding the end of said opening on the rear of said board, the end of said opening (3) on the rear of said board being closed by said metal sheet, characterised by:

an integral coating film (11) formed by plating on the inside wall of said opening, the lateral face of the adhesive layer (7) exposed to said opening (3) and the opening bottom-forming face of the metal sheet (5) closing the end of the opening on the rear side of said board, and

an integral coating film (9) forming plating at least the area on the rear side of the board surrounding the area where said metal is bonded, the outer peripheral face of said adhesive layer (7), and the lateral side and underside surface of said metal sheet (5).

2. A board according to claim 1, wherein the area surrounding the end of said opening on the rear side of the board has a recess so as to form a stepped portion (13) constituting the bottom of said opening, said metal sheet (5) being bonded through said adhesive layer (7) to said stepped portion (13) formed by said recess.

3. A board according to claim 2, wherein a recessed clearance (12) is formed between an inner peripheral face of said recess and the opposing outer peripheral face of the metal sheet (5).

4. A board according to claim 3, wherein the metal sheet (5) is positioned on the stepped portion (13) in said recess so that the outer peripheral face of the metal sheet and the inner peripheral face of said recess contact each other at a number of sections whereby said recessed clearance maintains a predetermined spacing.

5. A process for producing a printed wiring board for mounting electronic parts, comprising a sequence of the following steps (a) to (d):

(a) forming a through opening in that region of a printed wiring board containing a plastic material where electronic parts are to be mounted;

(b) bonding a metal sheet through an adhesive layer to the area surrounding the end of said opening on the rear side of the board;

(c) plating the external surface of the board including the metal sheet, the inside wall of said opening, the lateral face of the adhesive layer exposed to said opening, and the outer peripheral face of said adhesive layer; and

(d) forming a circuit in the usual way on the board manufactured through said steps.

6. A process for producing a printed wiring board for mounting electronic parts comprising a sequence of the following steps (a) to (e):

(a) forming a recess on the rear side of the specific region of a printed wiring board contain-

ing a plastic material where electronic parts are to be mounted;

(b) bonding a metal sheet through an adhesive layer to the bottom of said recess;

(c) forming an opening in said specific region on the front of said board so that said opening will extend to at least said metal sheet;

(d) plating the external surface of the board including said metal sheet, the inside wall of said opening, the lateral face of the adhesive layer exposed to said opening, and the outer peripheral face of said adhesive layer; and

(e) forming a circuit in the usual way on the board manufactured through said steps.

7. A process according to claim 6, wherein in step (b) the metal sheet is bonded to the bottom of said recess in such a manner that a recessed groove having a predetermined clearance will be formed between an outer peripheral face of said metal sheet and an opposing inner peripheral face of said recess.

8. A process according to claim 7, wherein in step (b) the metal sheet is bonded by positioning it on the stepped portion in said recess so that the inner peripheral face of said recess and the opposing outer peripheral face of said metal sheet will contact each other at a number of sections whereby said recessed groove will maintain the predetermined clearance.

Patentansprüche

1. Gedruckte Schaltungsplatte zum Befestigen elektronischer Teile, wobei die Platte ein Plastikmaterial (1), das mit einer durchgehenden Öffnung (3); in dem Bereich versehen ist, in dem die elektronischen Teile zu befestigen sind, und ein Metallblech (5) aufweist, das mittels einer Haftschrift (7) wenigstens auf der das Ende der Öffnung auf der Rückseite der Platte umgebenden Fläche mit der Rückseite der Platte verbondet ist, wobei das Ende der Öffnung (3) auf der Rückseite der Platte durch das Metallblech verschlossen ist, gekennzeichnet durch

einen einstückigen Beschichtungsfilm (11), der durch Plattieren auf der Innenwand der Öffnung, der der Öffnung (3) zugewandten Seitenfläche der Haftschrift (7) und der der Öffnungsboden bildenden Fläche des Metallblechs (5), welches das Ende der Öffnung auf der Rückseite der Platte verschließt, gebildet ist, und

einen einstückigen Beschichtungsfilm (9), der durch Plattieren wenigstens der Fläche auf der Rückseite der Platte, welche denjenigen Bereich umgibt, in dem das Metall verbondet ist, der äußeren Umfangsfläche der Haftschrift (7), der Seite und der Unterseite des Metallblechs (5) gebildet ist.

2. Platte nach Anspruch 1, bei der die das Ende der Öffnung auf der Rückseite der Platte umgebende Fläche eine Ausnehmung aufweist, um einen gestuften Bereich (13) zu bilden, welcher den Boden der Öffnung bildet, wobei das Metallblech (5) über die Haftschrift (7) mit dem durch die Ausnehmung gebildeten gestuften Bereich (13) verbondet ist.



3. Platte nach Anspruch 2, bei der ein ausgesparter Freiraum (12) zwischen einer inneren Umfangsfläche der Ausnehmung und der gegenüberliegenden äußeren Umfangsfläche des Metallblechs (5) gebildet ist.

4. Platte nach Anspruch 3, bei der das Metallblech (5) auf dem gestuften Bereich (13) in der Ausnehmung derart angeordnet ist, daß die äußere Umfangsfläche des Metallblechs und die innere Umfangsfläche der Ausnehmung sich an einer Anzahl von Stellen berühren, wodurch den ausgesparten Freiraum einen vorbestimmten Abstand beibehält.

5. Verfahren zur Herstellung einer gedruckten Schaltungsplatte zum Befestigen elektronischer Teile, mit der Abfolge der folgenden Schritte (a) bis (d):

(a) Bilden einer durchgehenden Öffnung in dem Bereich einer ein Plastikmaterial enthaltenden gedruckten Schaltungsplatte, dort wo die elektronischen Teile zu befestigen sind;

(b) Verbonden eines Metallblechs mittels einer Haftschrift mit der das Ende der Öffnung auf der Rückseite der Platte umgebenden Fläche;

(c) Plattieren der das Metallblech enthaltenden Außenfläche der Platte, der Innenwand der Öffnung, der Seitenfläche der der Öffnung zugewandten Haftschrift und der äußeren Umfangsfläche der Haftschrift; und

(d) Bilden einer Schaltung in der üblichen Weise auf der mit diesen Schritten hergestellten Platte.

6. Verfahren zur Herstellung einer gedruckten Schaltungsplatte zum Befestigen elektronischer Teile, mit der Abfolge der folgenden Schritte (a) bis (e):

(a) Bilden einer Ausnehmung auf der Rückseite des bestimmten Bereichs einer ein Plastikmaterial enthaltenden gedruckten Schaltungsplatte, dort wo die elektronischen Teile zu befestigen sind;

(b) Verbonden eines Metallblechs mittels einer Haftschrift mit dem Boden der Ausnehmung;

(c) Bilden einer Öffnung in dem bestimmten Bereich auf der Vorderseite der Platte, derart, daß sich die Öffnung mindestens bis zu dem Metallblech erstreckt;

(d) Plattieren der das Metallblech enthaltenden Außenfläche der Platte, der Innenwand der Öffnung, der Seitenfläche der der Öffnung zugewandten Haftschrift und der äußeren Umfangsfläche der Haftschrift; und

(e) Bilden einer Schaltung in der üblichen Weise auf der mit diesen Schritten hergestellten Platte.

7. Verfahren nach Anspruch 6, bei dem das Metallblech im Schritt (b) mit dem Boden der Ausnehmung derart verbondet wird, daß eine ausgesparte Nut mit einem vorbestimmten Freiraum zwischen einer äußeren Umfangsfläche des Metallblechs und einer gegenüberliegenden inneren Umfangsfläche der Ausnehmung gebildet wird.

8. Verfahren nach Anspruch 7, bei dem das Metallblech im Schritt (b) verbondet wird, indem es derart auf dem gestuften Bereich in der Ausnehmung angeordnet wird, daß die innere

Umfangsfläche der Ausnehmung und die gegenüberliegende äußere Umfangsfläche des Metallblechs sich an einer Anzahl von Abschnitten berühren, wodurch die ausgesparte Nut einen vorbestimmten Freiraum beibehält.

Revendications

1. Carte de circuit imprimé pour monter des pièces électroniques, la carte comportant un matériau plastique (1) formé avec une ouverture transversante (3) dans la région où la pièces électroniques sont à monter, ainsi qu'une tôle de métal (5) liée par une couche d'adhésif (7), à l'arrière de la carte, au moins sur sa zone entourant l'extrémité de ladite ouverture à l'arrière de ladite carte, l'extrémité de ladite ouverture (3) de l'arrière de ladite carte étant obturée par ladite tôle de métal, caractérisée par:

un film de revêtement d'une pièce (11) formé par placage sur la paroi intérieure de ladite ouverture, sur la face latérale de la couche d'adhésif (7) visible dans ladite ouverture (3) et sur la face, formant le fond de l'ouverture, de la tôle de métal (5) qui obture l'extrémité de l'ouverture sur la face arrière de ladite carte, et

un film de revêtement d'une pièce (9) formé par placage au moins sur la zone de la face arrière de la carte qui entoure la zone où ledit métal est lié, sur la face périphérique extérieure de ladite couche d'adhésif (7) et sur la face latérale et la face inférieure de ladite tôle de métal (5).

2. Carte selon la revendication 1, dans laquelle la zone entourant l'extrémité de ladite ouverture sur la face arrière de la carte présente un évidement de façon à former une portion décalée (13) constituant le fond de ladite ouverture, ladite tôle de métal (5) étant liée, par l'intermédiaire de ladite couche d'adhésif (7), à ladite portion décalée (13) formée par ledit évidement.

3. Carte selon la revendication 2, dans laquelle un jeu évidé (12) est formé entre une face périphérique intérieure dudit évidement et la face périphérique extérieure opposée de la tôle de métal (5).

4. Carte selon la revendication 3, dans laquelle la tôle de métal (5) est placée sur la portion décalée (13) dans ledit évidement de façon que la face périphérique extérieure de la tôle de métal et la face périphérique intérieure dudit évidement viennent en contact l'une avec l'autre en un certain nombre de sections, ce par quoi ledit jeu évidé maintient un écartement prédéterminé.

5. Procédé de production d'une carte de circuit imprimé pour monter des pièces électroniques, comportant la suite des étapes suivantes (a) à (d):

(a) former une ouverture transversante dans la région d'une carte de circuit imprimé qui contient un matériau plastique où les pièces électroniques sont à monter;

(b) lier une tôle de métal, par l'intermédiaire d'une couche d'adhésif, à la zone entourant l'extrémité de ladite ouverture sur la face arrière de la carte;

(c) plaquer la surface extérieure de la carte



comprenant la tôle de métal, la paroi intérieure de ladite ouverture, la face latérale de la couche d'adhésif visible dans ladite ouverture, et la face périphérique extérieure de ladite couche d'adhésif;

(d) former, de la façon habituelle, un circuit sur la carte fabriquée selon lesdites étapes.

6. Procédé de production d'une carte de circuit imprimé pour monter des pièces électroniques, comportant la suite des étapes suivantes (a) à (e);

(a) former un évidement sur la face arrière de la région spécifique d'une carte de circuit imprimé contenant un matériau plastique où les pièces électroniques sont à monter;

(b) lier une tôle de métal, par l'intermédiaire d'une couche d'adhésif, au fond dudit évidement;

(c) former une ouverture dans ladite région spécifique sur l'avant de ladite carte de façon que ladite ouverture s'étende au moins jusqu'à ladite tôle de métal;

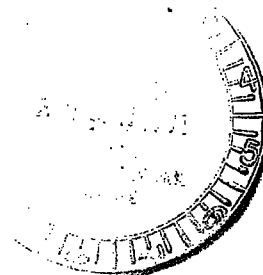
(d) plaquer les surfaces extérieures de la carte comprenant la tôle de métal, la paroi intérieure de

ladite ouverture, la face latérale de la couche d'adhésif visible dans ladite ouverture et la face périphérique extérieure de ladite couche d'adhésif; et

(e) former, de la façon habituelle, un circuit sur la carte fabriquée selon lesdites étapes.

7. Procédé selon la revendication 6, dans lequel dans l'étape (b), on lie la tôle de métal au fond dudit évidement de façon telle qu'une rainure évidée présentant un jeu prédéterminé se forme entre une face périphérique extérieure de ladite tôle de métal et une face périphérique intérieure opposée dudit évidement.

8. Procédé selon la revendication 7, dans lequel dans l'étape (b), on lie la tôle de métal en la plaçant sur la portion décalée dans ledit évidement de façon telle que la face périphérique intérieure dudit évidement et la face périphérique extérieure opposée de ladite tôle de métal viennent en contact l'une avec l'autre en un certain nombre de sections, ce par quoi ladite rainure évidée va maintenir le jeu prédéterminé.



D.O.R. 28 JAN '91

