Description

Background of the invention

The present invention relates to a lead frame or an electronic device (including also a semiconductor device) which employs it, and is directed toward, for example, a semiconductor device which has a plurality of leads and which is molded in a resin under the state that these leads and a semiconductor chip having a plurality of electrodes are connected by wires.

A lead frame according to the prior art part of claim 1 is known from WO—A—8303164.

In a resin-molded type semiconductor device such as IC or LSI, a lead frame is used at the stage of assemblage.

Fig. 2 shows a lead frame which was developed by the inventor et al. before the present invention and which is now in use. As shown in the Figure, the lead frame is integrally formed with a tab 2 which serves to mount a semiconductor element (chip) 1 thereon, a plurality of leads 3a and 3b (including tab suspension leads 4) which are arranged substantially radiately around the tab 2, a dam 5 which couples the leads, and an outer frame 6 which supports the whole on the outermost side (these are collectively called the "lead frame"). At a molding step, a structure in which the desired electrodes of the chip disposed on the tab and the desired leads are connected by wires 7 made of, e.g., gold (Au) is molded in a resin. Thereafter, the dam parts 5 and the outer frame are removed to separate the individual leads, whereby an electronic device is finished up.

In this lead frame, the lead portions inside the dam 5 to be molded in the resin are termed the "inner leads" 3a, and the portions outside it are termed the "outer leads" 3b.

As partly shown on enlarged scale in Fig. 3, the inner leads 3a have their fore end parts 3c formed so as to project toward bonding pads 8 which are provided on the peripheral edge of the chip. Meanwhile, as the trend of the packages of semiconductor devices, the packages have been rendered smaller in size and increased in the number of pins as described in a journal 'Nikkei Electronics' published by Nikkei McGraw-Hill Inc., dated June 4, 1984, pp. 141—152. In this regard, the inventor's study has revealed that the promotions of the reduction in size and the increase in the number of pins are attended with the following problems:

(1) The spacing A between the dam 5 and the tab 2 as indicated in Fig. 3 shortens, so that a length l in the inner lead 3a from the dam to the connection point of the bonding wire decreases. This results in a shorter invasion path of water, which worsens a resistance to moisture.

(2) The depth B_1 of the inner lead 3a decreases, so that the mechanical and thermal durabilities of the package worsen and that the resistance to moisture degrades. More specifically, when the depth B_1 decreases, the amount of the resin to be packed in the corresponding space lessens. When a temperature cycle test is conducted under this condition, openings are liable to appear at the interface between the lead frame and the resin on account of the difference of the coefficients of thermal expansion thereof, and eventually, cracks sometimes arise.

Moreover, the resin itself has a water absorptivity. Therefore, when the depth B_1 is smaller, water is more prone to reach the bonding wire to that extent, so the resistance to moisture deteriorates.

(3) As the spacing A between the dam 5 and the tab 2 becomes shorter, the magnitude of projection of the fore end of the inner lead is inevitably made smaller. Therefore, a wire bonding area S decreases to that extent, to diminish a bonding deviation margin.

The present invention has been made in order to solve the problems listed above.

Summary of the invention

A typical aspect of performance of the invention disclosed in the present application will be briefly summarized below.

A lead frame for a resin-molded package having a tab for mounting a semiconductor chip thereon, a plurality of leads arranged around the tab, and a dam and an outer frame coupling the plurality of leads; is put into a structure wherein some or all of the plurality of leads have end parts which are formed so as to bend reversely to a sense from those leads toward bonding pads arranged on the peripheral edge of the chip fixed on the tab.

Owing to such structure, the amount of inner leads entering a resin can be sufficiently secured, a leakage path can be set long, and a large wire bonding area can be held on the lead, so that a lead frame for a resin-molded package which is excellent in the points of mechanical strength and resistance to moisture is provided.

Brief description of the drawings

Fig. 1 is a partly enlarged plan view of a lead frame showing an embodiment of the present invention;

Fig. 2 is a general plan view showing an example of a lead frame;

Fig. 3 is a partly enlarged view of the lead frame shown in Fig. 2;

Fig. 4 and Figs. 5(a) to 5(g) are enlarged plan views each showing an example of application of the lead frame according to the present invention;

Fig. 6 is a general perspective view, partly cut away, of a resin-molded semiconductor device which uses the lead frame according to the present invention;

Fig. 7 is a vertical sectional view of the semiconductor device in Fig. 6;

Figs. 8 and 9 are partly enlarged sectional views of semiconductor devices showing the states of wire bonding, wherein Fig. 8 illustrates a conventional example and Fig. 9 an example in the case of the present invention;

Fig. 10 is a plan view of a glass-molded package semiconductor device showing another embodiment of the present invention;

Fig. 11 is a sectional view corresponding to Fig. 10;

Fig. 12 is a conceptual view showing a bonding state in a prior art; and

Fig. 13 is a conceptual view showing a bonding state in the present invention.

Description of the preferred embodiments

[Embodiment 1]

Now, the present invention will be described with reference to the drawings.

Fig. 1 shows one embodiment of the present invention, and it is a plan view in which a lead frame for use in the resin-molded package of an IC is partially enlarged.

Referring to the Figure, numeral 2 designates a tab, numeral 4 a tab suspension lead, symbol 3a an inner lead, numeral 5 a dam, and symbol 3b an outer lead, and these are formed as an integral lead frame. Numeral 1 indicates a semiconductor chip, which is mounted on the tab 2. Bonding pads 8 are provided along the peripheral edge of this chip. Shown at numeral 7 is a bonding wire (for example, Au wire), which is connected between one point 9 on the inner lead 3a near the inner end thereof and the bonding pad 8 of the chip 1. The whole lead frame is formed by punching or etching a metal sheet made of Cu or a Cu alloy. If necessary, the surfaces of the tab 2 and the inner leads 3a are formed with plating films of gold (Au), silver (Ag) or the like.

As illustrated in the Figure, the characterizing feature of the lead frame according to the present invention is that the inner lead 3a inside the dam part 5 of the lead frame is so shaped as to extend toward the tab 2 (or the chip 1) and once bend and that the inner end 3d thereof is formed in a sense away from the tab 2. One end of the wire 7 is bonded by thermocompression by setting a bonding coordinate point at the point 9 lying on the inner end side of the inner lead 3a, while the other end of the wire is bonded to the bonding pad 8 on the side of the chip 1. That is, the inner end 3d of the inner lead 3a lies on the extension line of the bonding wire 7.

Owing to the above construction, even in a slim package in which the dimension between the dam and the tab (called "dimension A") is short, the depth of the inner lead ("dimension B_2") can be held sufficient, so that the amount of a resin to be packed in the corresponding space increases to raise the mechanical and thermal strengths of the package. In addition, since a distance from a mold surface to the bonding point 9 can be held sufficient, a leakage path can be rendered long, and a semiconductor device having a good resistance to moisture is fabricated. Moreover, a large area can be secured for the fore end part of the inner lead bent outwards, and a wire bonding area enlarges, with the result that a margin for a positional deviation at the wire bonding step can be set large.

Such inner leads are appropriately adopted principally as shorter leads which are arranged in a place where the spacing A between the tab (chip) and a resin mold line (dam line) is comparatively short. Of course, the construction of the invention can be utilized also for the fore ends of leads in a place where the aforementioned spacing is long, for example, the fore end of a longer lead 3e extending along the tab suspension lead 4 as shown in Fig. 1. In this case, however, scrupulous care must be taken lest the interval of the leads should increase due to the presence of the bent portions.

In the case of the shorter lead, modifications as shown in Fig. 4 and Figs. 5(a) to 5(g) are also considered. The lead shown in Fig. 4 has a structure in which the invasion path of water (also termed the "leakage path") is lengthened. In the case of the shorter lead, it is preferable that a protrusion 10 for preventing the lead from falling off is especially provided in a sideward direction. Numeral 20 indicates a space portion, which is filled up with the resin at the resin molding step thereby to enhance the resistance to moisture and the reliability of the semiconductor device.

A shape shown in Fig. 5(b) may well be employed. In this case, lead corners 21 and 22 function also to prevent the lead from falling off. Noteworthy is that the lead to serve as a bonding surface spreads fanwise from the inner end 3d of the lead. The reason is that the versatility of arrangement of the bonding pads is enhanced thereby to improve the versatility of design. The inventor et al. employ a technique shown in Fig. 12 as a bonding method for attaining a high reliability. To the end of preventing the short-circuit between the wires and the short-circuit between the wire and the tab due to the flow of the wires, the wire 7 is laid within the extent between dot-and-dash lines indicated in the Figure. These dot-and-dash lines are straight lines which connect the bonding coordinate point 9 and the corners 21 and 22 at the fore end of the inner lead. According to this method, the bonding pad 8 can be freely disposed within the extent indicated by arrows in the Figure. According to the present invention, the bonding coordinate point 9 is set farther from the chip 1 (or the tab 2) so as to enlarge the bonding area. In this regard, when a coordinate point 9' is merely set farther by the use of a lead as shown in Fig. 12, the versatility of installation of the bonding pad lowers as indicated by two-dot chain lines in the Figure. In contrast, according to the present invention, the inner lead spreads fanwise toward the chip as shown in Fig. 13, so that even when the bonding coordinate point is set farther at 9', a sufficient versatility of installation of the bonding pad (indicated by arrows) is achieved.

In Figs. 5(c) and 5(d), the outer lead 3b and the inner lead 3a are set at approximately equal widths without providing the protrusion 10 for preventing the lead from falling off. The prevention of the falling-off of the lead is effected in such a way that the amount of the resin to enter the

space portion 20 is increased by enlarging the space portion. This lead shape is suitable for increase in the number of pins, and makes it possible to provide a package which can sufficiently meet the requirements of the package tending toward a reduced size and an increased number of pins and which has a high reliability.

Fig. 5(e) shows the lead in which the protrusions 10 for preventing the lead from falling off are provided in the lead shape shown in Fig. 5(b), and which affords a high reliability and a high versatility of design.

Fig. 5(f) shows a modified structure of the embodiment in Fig. 5(c), in which one side of the inner end 3d of the lead juts beyond the outer lead 3b and functions also to prevent the lead from falling off.

Since the embodiments of Figs. 5(c)—5(f) have the bonding lead surfaces spread fanwise likewise to the embodiment of Fig. 5(b), they produce similar effects.

In the embodiment of Fig. 5(g), the corners 20 and 21 of the inner lead function to prevent the lead from falling off, and besides, the space portion 20 is enlarged to achieve further enhancements in the reliability and the resistance to moisture.

Fig. 6 is a perspective view showing the general configuration of a skinny (slim) type dual in-line resin-molded semiconductor device which uses the lead frame described in the above embodiment and which is partly cut away. The present invention is particularly effective for the skinny DIP in which the dimension A on the shorter lead side is small. Fig. 7 is a sectional view showing the internal structure of the semiconductor device shown in Fig. 6. In the Figure, numeral 11 designates a resin mold member. The other structural portions common to the constituent portions shown in Fig. 1 are assigned the same reference symbols.

As seen from the Figure, in the elongate type package called the "slim package", the dimension A is very small on the shorter lead side. Therefore it has heretofore been impossible to satisfactorily attain the resistance to moisture, the mechanical strength, etc., whereas an electronic device excellent in the resistance to moisture, the mechanical strength and the reliability is fabricated by the use of the lead frame of the present invention.

[Effects]

With the lead frame having the internal end of the inner lead as in Embodiment 1 described above and the resin-molded semiconductor device employing this lead frame, the following effects are attained:

(1) That end of an inner lead which lies on the extension of a wire connecting the bonding pad of a chip and a bonding coordinate point on the lead side and which is bent in a sense away from the chip is used as a wire bonding area, whereby a sufficient wire bonding area can be held on the lead.

(2) The aim of a bonding coordinate point is permitted to be set somewhat (about 0.4 mm) rearward of the end part of an inner lead on the chip side thereof (set closer to an outer lead). Heretofore, since the bonding coordinate point 9 on the inner lead 3a has been set in the vicinity of the chip 1 as illustrated in Fig. 8, a wire 7 has sometimes sagged between a tab 2 and the lead 3a at the wire-bonding step. Moreover, since the degree of inclination θ_1 of the wire from the chip side has become great, a wire loop has been liable to collapse, and a fault in which the wire short-circuits to the edge of the chip 1 has been liable to occur.

In contrast, in case of the present invention, the bonding coordinate point 9 on the lead is set rearwards and a wire 7 is accordingly formed long over the lead 3a as illustrated in Fig. 9, whereby the sagging of the wire 7 lessens owing to the function that the lead under the wire supports the wire as indicated by a dot-and-dash line in the Figure. Besides, the angle of inclination θ_2 of the wire becomes small, a wire loop is less prone to collapse and the short-circuit to the chip 1 lessens.

(3) The magnitude in which an inner lead enters a resin mold member can be rendered great. Thus, a leakage path from the root of an outer lead to a bonding position on the mold side lengthens to enhance the reliability in regard to the resistance to moisture.

(4) Owing to a shape curved like a "hook", an inner lead is effective to be prevented from falling off a resin mold member.

(5) The sense in which an inner lead to serve as a bonding surface is drawn is opposite to a tab, whereby the magnitude of the inner lead to enter a resin mold member can be increased without enlarging the dimension (dimension A) between the tab and a dam, so that the mechanical strength of a package can be ensured.

(6) Owing to the above items (1), (2), (3), (4) and (5), a high resistance to moisture, a high reliability and a mechanical strength can be secured without enlarging the dimension A, so that the moisture resistance and the reliability of a small-sized package the dimension A of which is very small can be enhanced.

[Embodiment 2]

Fig. 10 shows another embodiment of the present invention and is a plan view showing the interior of a leadless type glass-encapsulated package, while Fig. 11 is a sectional view corresponding to Fig. 10.

Referring to the Figures, numeral 12 designates a ceramic package base, and a semiconductor chip 1 is mounted on the inner surface thereof. Numeral 13 indicates the interconnection of a metallized film which corresponds to the lead in the case of the resin encapsulation, and a part of which is buried in the ceramic base 12. One side of the interconnection is exposed inside the package, while the other side is connected to a semicircular slot 14 outside the package base. A metallized film is deposited on the inner surface

of the slot 14 and lies in contact with a pin (not shown) on a wired board, thereby to perform wiring connection. As shown in Fig. 10, that part of the metallized interconnection 13 which is exposed inside the package base is bent on its inner side near the chip, and the inner end part 15 thereof extending outwards is used as a bonding portion, which is bonded by a wire 7 with a bonding pad disposed at the peripheral edge of the chip. Numeral 16 denotes a cap made of metal or ceramic, and the space between this cap and the ceramic base is sealed through a glass film 17 or the like.

[Effects]

With a semiconductor device wherein the inner end of the metallized interconnection of the ceramic package base explained in Embodiment 2 described above is formed in the opposite sense (outwards) to the lead-in sense of wire bonding, the following effects are attained:

(1) A sufficient wire bonding area can be held on a metallized interconnection in a ceramic base.

(2) The sagging of a wire can be lessened to lessen the short-circuit between the edge of a chip and the wire.

While, in the above, the invention made by the inventor has been concretely described in conjunction with embodiments, it is needless to say that the present invention is not restricted to the foregoing embodiments but that it can be variously altered within the scope not departing from the purport thereof.

By way of example, in a semiconductor device of the film carrier type wherein leads and a tab are printed on the surface of a flexible insulating film, a semiconductor chip is mounted on the tab, the chip and the leads are subsequently bonded by wires, and the resultant structure is thereafter molded in a resin; when the present invention is applied to the shape of the inner ends of the leads, effects similar to those of the embodiments are attained for securing bonding areas on the leads.

In addition, similar effects are attained even with a configuration in which conventional leads and the leads of the present invention are alternately arranged.

[Applicability]

The present invention is applicable to all semiconductor devices and electronic devices of the type which has a large number of pins or leads and in which they are connected with the electrodes of a chip by wire bonding.

The present invention is advantageous when utilized especially for small-sized packages intended for high density integration, for example, an elongate package such as of the slim type and a package having a large number of pins.

Claims

1. A lead frame comprising:

a tab (2) which supports a chip (1); and

a plurality of leads which are arranged around said tab (2) and each of which has a section (3a) located close to said tab (2);

characterised in that said section (3a) of at least some of said leads includes:

a first lead portion which extends toward said tab (2); and

a second lead portion (3d) which is continuous to said first lead portion and which is bent in a sense away from said tab (2), the second lead portion providing a bonding location for a wire.

2. The lead frame of claim 1, wherein said second lead portion (3d) of said lead is so bent that its principal part lies along a straight line which interconnects said second lead portion (3d) and a wire bonding space (8) in the chip (1).

3. The lead frame of claim 1 or 2, wherein said second lead portion (3d) has, when viewed in plan, a trapezoidal shape whose lateral width decreases with increasing distance from said tab (2). (Figs. 5a...5g).

4. The lead frame of claim 1 or 2, wherein said second lead portion (3d) has, when viewed in plan, a trapezoidal shape whose lateral width increases with increasing distance from said tab (2). (Fig. 4).

5. The lead frame of claim 1 or 2, wherein said first lead portion is bifurcated into branches, and said second lead portion (3d) is continuous to the respective branches and is folded back in a sense away from said tab (2) within a region which is held between said branches. (Figs. 5a, 5d, 5g).

6. The lead frame of any of claims 1 to 5, wherein said section (3a) of at least some of said leads further includes a third lead portion which extends in parallel with a peripheral wall of said tab (2) facing said first lead portion, and which functions as a connecting portion between said first lead portion and said second lead portion (3d). (Figs. 1, 4).

7. The lead frame of any of claims 1 to 6, including a dam portion (5) which couples said plurality of leads to one another, a section (3a) of each lead being located between said dam portion (5) and said tab (2), and said section (3a) of the lead as to which a distance from a connection region of said dam portion (5) and said lead to said tab (2) is short being shaped so as to include said first lead portion and said second lead portion (3d).

8. The lead frame of claim 7, wherein said section (3a) of the lead as to which the distance from the connection region of said dam portion (5) and said lead to said tab (2) is long is shaped so as not to include said second lead portion (3d).

9. The lead frame of any of claims 1 to 8, wherein a root part of said first lead portion is provided with protrusions (10) which jut out sidewards. (Fig. 5e).

10. An electronic device comprising:

(a) a lead frame according to any of claims 1 to 9, wherein said chip (1) is fixed to said tab (2);

(b) wires (7) which electrically connect said leads and said chip (2), and

of the slot 14 and lies in contact with a pin (not shown) on a wired board, thereby to perform wiring connection. As shown in Fig. 10, that part of the metallized interconnection 13 which is exposed inside the package base is bent on its inner side near the chip, and the inner end part 15 thereof extending outwards is used as a bonding portion, which is bonded by a wire 7 with a bonding pad disposed at the peripheral edge of the chip. Numeral 16 denotes a cap made of metal or ceramic, and the space between this cap and the ceramic base is sealed through a glass film 17 or the like.

[Effects]

With a semiconductor device wherein the inner end of the metallized interconnection of the ceramic package base explained in Embodiment 2 described above is formed in the opposite sense (outwards) to the lead-in sense of wire bonding, the following effects are attained:

(1) A sufficient wire bonding area can be held on a metallized interconnection in a ceramic base.

(2) The sagging of a wire can be lessened to lessen the short-circuit between the edge of a chip and the wire.

While, in the above, the invention made by the inventor has been concretely described in conjunction with embodiments, it is needless to say that the present invention is not restricted to the foregoing embodiments but that it can be variously altered within the scope not departing from the purport thereof.

By way of example, in a semiconductor device of the film carrier type wherein leads and a tab are printed on the surface of a flexible insulating film, a semiconductor chip is mounted on the tab, the chip and the leads are subsequently bonded by wires, and the resultant structure is thereafter molded in a resin; when the present invention is applied to the shape of the inner ends of the leads, effects similar to those of the embodiments are attained for securing bonding areas on the leads.

In addition, similar effects are attained even with a configuration in which conventional leads and the leads of the present invention are alternately arranged.

[Applicability]

The present invention is applicable to all semiconductor devices and electronic devices of the type which has a large number of pins or leads and in which they are connected with the electrodes of a chip by wire bonding.

The present invention is advantageous when utilized especially for small-sized packages intended for high density integration, for example, an elongate package such as of the slim type and a package having a large number of pins.

Claims

1. A lead frame comprising:

a tab (2) which supports a chip (1); and

a plurality of leads which are arranged around said tab (2) and each of which has a section (3a) located close to said tab (2);

characterised in that said section (3a) of at least some of said leads includes:

a first lead portion which extends toward said tab (2); and

a second lead portion (3d) which is continuous to said first lead portion and which is bent in a sense away from said tab (2), the second lead portion providing a bonding location for a wire.

2. The lead frame of claim 1, wherein said second lead portion (3d) of said lead is so bent that its principal part lies along a straight line which interconnects said second lead portion (3d) and a wire bonding space (8) in the chip (1).

3. The lead frame of claim 1 or 2, wherein said second lead portion (3d) has, when viewed in plan, a trapezoidal shape whose lateral width decreases with increasing distance from said tab (2). (Figs. 5a...5g).

4. The lead frame of claim 1 or 2, wherein said second lead portion (3d) has, when viewed in plan, a trapezoidal shape whose lateral width increases with increasing distance from said tab (2). (Fig. 4).

5. The lead frame of claim 1 or 2, wherein said first lead portion is bifurcated into branches, and said second lead portion (3d) is continuous to the respective branches and is folded back in a sense away from said tab (2) within a region which is held between said branches. (Figs. 5a, 5d, 5g).

6. The lead frame of any of claims 1 to 5, wherein said section (3a) of at least some of said leads further includes a third lead portion which extends in parallel with a peripheral wall of said tab (2) facing said first lead portion, and which functions as a connecting portion between said first lead portion and said second lead portion (3d). (Figs. 1, 4).

7. The lead frame of any of claims 1 to 6, including a dam portion (5) which couples said plurality of leads to one another, a section (3a) of each lead being located between said dam portion (5) and said tab (2), and said section (3a) of the lead as to which a distance from a connection region of said dam portion (5) and said lead to said tab (2) is short being shaped so as to include said first lead portion and said second lead portion (3d).

8. The lead frame of claim 7, wherein said section (3a) of the lead as to which the distance from the connection region of said dam portion (5) and said lead to said tab (2) is long is shaped so as not to include said second lead portion (3d).

9. The lead frame of any of claims 1 to 8, wherein a root part of said first lead portion is provided with protrusions (10) which jut out sidewards. (Fig. 5e).

10. An electronic device comprising:

(a) a lead frame according to any of claims 1 to 9, wherein said chip (1) is fixed to said tab (2);

(b) wires (7) which electrically connect said leads and said chip (2), and

(c) a sealing member (11) which seals said lead frame, said tab (2) and said wires (7). (Fig. 7).

11. The device of claim 10, wherein one end of the lead located in a place where a distance from an outer wall of said sealing member (11) to said tab (2) is short is shaped so as to include said second lead portion (3d).

12. The device of claim 10 or 11, wherein each wire (7) electrically connects a wire bonding space (8) provided in said chip (1) and said second lead portion (3d), and a wire connection point (9) in said second lead portion (3d) lies in the vicinity of an extreme end of said second lead portion (3d). (Fig. 1).

13. The device of any of claims 10 to 12, wherein said sealing member (11) is made of a resin.

14. The device of any of claims 10 to 13, wherein said sealing member (11) has a hermetic sealing structure.

Patentansprüche

1. Leiterrahmen mit

einem einen Chip (1) tragenden Lappen (2) und

mehreren um den Lappen (2) herum angeordneten Leitern, deren jeder einen in der Nähe des Lappens (2) befindlichen Abschnitt (3a) aufweist,

dadurch gekennzeichnet, daß der Abschnitt (3a) mindestens einiger der Leiter

einen auf den Lappen (2) zu verlaufenden ersten Leiterteil und

einen mit dem ersten Leiterteil zusammenhängenden und in einer von dem Lappen (2) weg führenden Richtung abgebogenen zweiten Leiterteil (3d) aufweist, der eine Bondstelle für einen Draht vermittelt.

2. Leiterrahmen nach Anspruch 1, wobei der zweite Leiterteil (3d) des Leiters so abgebogen ist, daß sein Hauptteil auf einer den zweiten Leiterteil (3d) mit einem Drahtbondbereich (8) in dem Chip (1) verbindenden geraden Linie liegt.

3. Leiterrahmen nach Anspruch 1 oder 2, wobei der zweite Leiterteil (3d) in Draufsicht eine Trapezform hat, deren seitliche Breite mit zunehmender Entfernung von dem Lappen (2) abnimmt. (Figuren 5a...5g).

4. Leiterrahmen nach Anspruch 1 oder 2, wobei der zweite Leiterteil (3d) in Draufsicht eine Trapezform hat, deren seitliche Breite mit zunehmender Entfernung von dem Lappen (2) zunimmt. (Figur 4).

5. Leiterrahmen nach Anspruch 1 oder 2, wobei der erste Leiterteil in Zweige aufgeteilt ist und der zweite Leiterteil (3d) mit den jeweiligen Zweigen zusammenhängt und in einem zwischen den Zweigen gehaltenen Bereich in einer von dem Lappen (2) weg führenden Richtung zurückgeklappt ist. (Figuren 5a, 5d, 5g).

6. Leiterrahmen nach einem der Ansprüche 1 bis 5, wobei der Abschnitt (3a) mindestens einiger Leiter ferner einen dritten Leiterteil enthält, der parallel zu einer dem ersten Leiterteil zugewandten Umfangswand des Lappens (2) verläuft und als Verbindungsteil zwischen dem ersten Leiterteil und dem zweiten Leiterteil (3d) dient. (Figuren 1, 4).

7. Leiterrahmen nach einem der Ansprüche 1 bis 6, umfassend einen Dammabschnitt (5), der die Mehrzahl von Leitern miteinander koppelt, wobei ein Abschnitt (3a) jedes Leiters zwischen dem Dammabschnitt (5) und dem Lappen (2) angeordnet ist, und wobei der besagte Abschnitt (3a) des Leiters, bezüglich dessen die Entfernung vom Verbindungsbereich zwischen dem Dammabschnitt (5) und dem Leiter zu dem Lappen (2) kurz ist, so geformt ist, daß er den ersten Leiterteil und den zweiten Leiterteil (3d) umfaßt.

8. Leiterrahmen nach Anspruch 7, wobei der besagte Abschnitt (3a) des Leiters, bezüglich dessen die Entfernung vom Verbindungsbereich zwischen dem Dammabschnitt (5) und dem Leiter zu dem Lappen (2) lang ist, so geformt ist, daß er den zweiten Leiterteil (3d) nicht umfaßt.

9. Leiterrahmen nach einem der Ansprüche 1 bis 8, wobei ein Wurzelabschnitt des ersten Leiterteils mit seitlich herausragenden Vorsprüngen (10) versehen ist. (Figur 5e).

10. Elektronisches Gerät mit

(a) einem Leiterrahmen nach einem der Ansprüche 1 bis 9, wobei den Chip (1) an dem Lappen (2) befestigt ist,

(b) Drähten (7), die die Leiter mit dem Chip (2) elektrisch verbinden, und

(c) einem Dichtelement (11), das den Leiterrahmen, den Lappen (2) und die Drähte (7) abdichtet. (Figur 7).

11. Gerät nach Anspruch 10, wobei ein Ende des Leiters, dort, wo der Abstand zwischen der Außenwand des Dichtelements (11) und dem Lappen (2) kurz ist, so geformt ist, daß es den zweiten Leiterteil (3d) umfaßt.

12. Gerät nach Anspruch 10 oder 11, wobei jeder Draht (7) einen an dem Chip (1) vorgesehenen Drahtbondbereich (8) mit dem zweiten Leiterteil (3d) elektrisch verbindet und eine Drahtverbindungsstelle (9) in dem zweiten Leiterteil (3d) in der Nähe eines äußeren Endes des zweiten Leiterteils (3d) liegt. (Figur 1).

13. Gerät nach einem der Ansprüche 10 bis 12, wobei das Dichtelement (11) aus Kunstharz besteht.

14. Gerät nach einem der Ansprüche 10 bis 13, wobei das Dichtelement (11) einen hermetisch abdichtenden Aufbau aufweist.

Revendications

1. Cadre à broches comportant:

— une plaquette (2) supportant un circuit intégré (1); et

— une pluralité de broches qui sont disposées autour de ladite plaquette (2) et dont chacune possède une portion (3a) située près de ladite plaquette (2);

caractérisé en ce que ladite portion (3a) d'au moins certaines desdites broches comprend:

— une première partie de broche s'étendant vers ladite plaquette (2); et

— une seconde partie de broche (3d) qui est continue jusqu'à ladite première partie de broche et qui est courbée dans un sens s'écartant de ladite plaquette (2), la seconde partie de broche constituant un emplacement de liaison pour un conducteur.

2. Cadre à broches selon la revendication 1, dans lequel ladite seconde partie de broches (3d) de ladite broche est courbée de sorte que sa partie principale se trouve le long d'une ligne droite réunissant ladite seconde partie de broche (3d) et un espace de liaison de conducteur (8) dans le circuit intégré (1).

3. Cadre à broches selon la revendication 1 ou 2, dans lequel ladite seconde partie de broche (3d) possède, en vue en plan, une forme trapézoïdale dont la largeur latérale diminue en s'éloignant de ladite plaquette (2). (Figures 5a...5g).

4. Cadre à broches selon la revendication 1 ou 2, dans lequel ladite seconde partie de broche (3d) possède en vue en plan, une forme trapézoïdale dont la largeur latérale augmente en s'éloignant de ladite plaquette (2). (Figure 4).

5. Cadre à broches selon la revendication 1 ou 2, dans lequel ladite première partie de broche est ramifiée, et ladite seconde partie de broche (3d) est continue jusqu'aux ramifications respectives et est repliée dans un sens s'écartant de ladite plaquette (2) à l'intérieur d'une région contenue entre lesdites ramifications. (Figures 5a, 5d, 5g).

6. Cadre à broches selon l'une des revendications 1 à 5, dans lequel ladite partie (3a) d'au moins certaines desdites broches comprend en outre une troisième partie de broche s'étendant parallèlement à une paroi périphérique de ladite plaquette (2) faisant face à ladite première partie de broche, et qui joue le rôle de partie de liaison entre ladite première partie de broche et ladite seconde partie de broche (3d). (Figures 1, 4).

7. Cadre à broches selon l'une quelconque des revendications 1 à 6, comprenant une liaison (5) reliant ladite pluralité de broches les unes aux autres, une portion (3a) de chaque broche étant située entre ladite liaison (5) et ladite plaquette (2), et ladite portion (3a) de la broche pour laquelle la distance est courte depuis une région de liaison de ladite liaison (5) et de ladite broche jusqu'à ladite plaquette (2), étant façonnée de manière à comprendre ladite première partie de broche et ladite seconde partie de broche (3d).

8. Cadre à broches selon la revendication 7, dans lequel ladite portion (3a) de la broche pour laquelle la distance est longue depuis la région de liaison de ladite liaison (5) et de ladite broche jusqu'à ladite plaquette (2), est façonnée de manière à ne pas comprendre ladite seconde partie de broche (3d).

9. Cadre à broches selon l'une quelconque des revendications 1 à 8, dans lequel une racine de ladite première partie de broche est munie de parties saillantes (10) qui font saillie latéralement. (Figure 5e).

10. Dispositif électronique comportant:

(a) un cadre à broches selon l'une quelconque des revendications 1 à 9, dans lequel ledit circuit intégré (1) est fixé à ladite plaquette (2).;

(b) des conducteurs (7) qui relient électriquement lesdites broches et ledit circuit intégré (1), et

(c) un élément d'étanchéité (11) qui enferme hermétiquement ledit cadre à broches, ladite plaquette (2) et lesdits conducteurs (7). (Figure 7).

11. Dispositif selon la revendication 10, dans lequel une extrémité de la broche située en un emplacement où une distance depuis une paroi latérale dudit élément d'étanchéité (11) à ladite plaquette (2) est courte, est façonnée de manière à inclure ladite seconde partie de broche (3d).

12. Dispositif selon la revendication 10 ou 11, dans lequel chaque conducteur (7) relie électriquement un espace de liaison de conducteur (8) prévu dans ledit circuit intégré (1) et ladite seconde partie de broche (3d), et un point de liaison de conducteur (9) dans ladite seconde partie de broche (3d) se trouve à proximité d'une extrémité de ladite seconde partie de broche (3d). (Figure 1).

13. Dispositif selon l'une quelconque des revendications 10 à 12, dans lequel ledit élément d'étanchéité (11) est constitué d'une résine.

14. Dispositif selon l'une quelconque des revendications 10 à 13, dans lequel ledit élément d'étanchéité (11) possède une structure d'étanchéité hermétique.

* C L M S *