Description

This invention relates to a ceramic package for a semiconductor device, and more particularly, to such a ceramic package in which generation of cracks can be prevented.

A ceramic package for mounting thereon a semiconductor chip or a similar electronic element is a package comprising a base made of ceramic, hereinafter referred to as a "ceramic base".

As well known in the prior art, ceramic is generally has a strong compression stress resistance, and a weak for tension resistance.

In a process for manufacturing semiconductor devices, a plurality of such ceramic packages are once stored in a storage or accommodation station, and picked up therefrom one by one and fed to the various work stations, such as a semiconductor chip mount station. In the accommodation station, the ceramic packages are guided by a suitable guide means, such as a rail, and fed in the forward direction. To smoothly feed these ceramic packages along the rail, it is usually necessary to provide gaps between side edges of the ceramic packages and side walls of the rail, and due to such gaps, the ceramic packages might slew transversely while being fed along the rail and come into touch with an adjacent ceramic package. This sometimes causes a generation of cracks or flaws in the ceramic package, particularly at corners or edge portions of the ceramic package. Also, a part of ceramic package is sometimes broken, i.e., edges of the ceramic package are sometimes nicked.

To prevent a generation of such cracks or flaws, as shown in Fig. 12, it is well known in the prior art for, a rectangular ceramic package to be provided with bevel portions B at the respective corners of the ceramic base, to avoid a possible concentration of stress when an external force is exerted on the ceramic package. Such a ceramic base is known, for example, from US-A-4 862 247.

In general, these bevel portions B effectively prevent the ceramic package form being broken at the corner portions, but do not completely avoid a generation of cracks or flaws in the ceramic package.

An object of the present invention is to provide a ceramic package used for mounting an electric element thereon, such as a semiconductor chip or the like, in which generation of cracks or flaws in the ceramic package are prevented.

According to the inventor's observations during experiments involving many samples, a generation of crack does not occur first at a corner which is formed by the bevel, but at a point inside of the ceramic base, and inward from the corner, as shown in Fig. 12. In particular, a laminated-type ceramic package generally has a via or through hole 10 which is filled with a conductive material for mutually connecting electrical patterns formed on the upper and lower surfaces of the ceramic package. In many samples of ceramic packages, the following has been observed; i.e. a crack extends toward the via, which generally has a low strength, from a point of edge of the package near to the via, as shown in Fig. 9. If such a large-sized crack is generated, a serious problem, for example, a disconnection of the electrical patterns in the vicinity of the via, arises.

To solve the above problem, there is provided a ceramic package for mounting an electric element thereon, such as a semiconductor chip, comprising a plate-shaped base made of a material consisting essentially of ceramic, the base having, in a plan view, at least one corner portion located between two adjacent side walls, characterized in that the corner portion comprises a main bevel and at least two auxiliary bevels located at the respective sides of the main bevel and extending to the two side walls, respectively, so that two first corners are defined between the main bevel and the auxiliary bevels, respectively, and two second corners are defined between the auxiliary bevels and the side walls of the base, respectively.

In the present invention, since a corner portion of the ceramic package is provided with a main bevel and two auxiliary bevels, if the ceramic package is moved suddenly, it first collides with a corner between the auxiliary bevel and the side wall of the package base. Then after one bound, the ceramic package collides with the opposite corner between the auxiliary bevel and the side wall. Thus, a distance between a position of the first collision to a position of the second collision is significantly reduced, with that of a ceramic package known in the prior art.

Consequently, according to the present invention, both of the positions of the first and second collisions are located on the side wall inward of the corner portions of the ceramic package. Therefore, a rotational moment exerted on the ceramic package due to a reaction force of the first collision becomes smaller, and as a result, a rotational energy of the ceramic package is reduced and, therefore, a tension force exerted on the package at a second collision becomes significantly smaller, and thus a generation of cracks caused by the second collision is prevented.

A particular embodiment of the present invention will now be described and contrasted with the prior art with reference to the accompanying drawings; in which:-

Figure 1 is a view illustrating an experiment in which a sample of ceramic package slides down along a slope;

Figure 2 shows a series of motions of the ceramic package after collision with a stopper and a bounce up at a corner thereof;

Figure 3 is a partial plan view of a ceramic package having second or auxiliary bevels as well as the main bevels according to the present invention;

Figure 4 is a partial perspective view of a ceramic package having additional bevels according to the present invention;

Figure 5 is a plan view illustrating the distances between the corners defined by these bevels;

Figure 6 is a partial plan view illustrating the dimensions of the corner provided with bevels;

Figures 7A, 7B and 7C are partial plan views illustrating the respective bevels, in which 7A shows bevels of an embodiment; 7B, a round-shaped bevel; and 7C, a bevel of the prior art;

Figure 8 shows experiments results for the samples of ceramic packages of a prior art example;

Figure 9 shows experiments results for the samples of ceramic packages of an embodiment of this invention;

Figure 10 is a view illustrating a sample of ceramic package which slews and is subject to a secondary collision;

Figure 11 shows dimensions of a typical embodiment of a ceramic package according to the present invention; and

Figure 12 is a partial plan view of a ceramic package having a bevel known in the prior art.

As understood from TABLE I and Figs. 8 and 9, according to the embodiment of this invention, the crack generation rate was significantly reduced, compared with the prior art and the comparative example.

First, a mechanism of the generation of cracks will be described with reference to Figs. 1 and 2. The inventors made a study of such a crack generating mechanism, and conducted experiments using an apparatus as shown in Fig. 1.

In this experiment, samples of the ceramic package 20 were allowed to slide down an inclined rail 21, and the states of the sliding samples were visually recorded by a high speed video reorder so that a mechanism of the generation of cracks could be analyzed. As a result, it has been noted that, as shown in Fig. 2. the ceramic package 20 is usually inclined very slightly with respect to a stopper surface 22 while sliding down. Thus, the ceramic package 20 collides with the stopper surface 22 by a new corner C_1 which was defined by a bevel B_1, as shown in (b) of Fig. 2. After one bounce, as shown in (c), the ceramic package 20 again collides at an opposite corner C_2,as shown in (d), which was defined by a bevel B_2. As a result of this experiment, it was noted that the generation of cracks was not caused by the first collision, but by the second collision, apparently for the following reasons.

At the time of the first collision, the ceramic package 20 maintains the same profile as it slides down the rail 21 and, therefore, only a compression force is exerted on the ceramic package 20. Such a mere compression force does not cause a generation of cracks. At the time of the second collision, however. the ceramic package 20 is subjected to a large rotational moment in a direction indicated by an arrow M about the position of first collision i.e., the corner C_1, due to a reaction force of the first collision, and therefore, the ceramic package 20 again collides with the stopper surface 22 at the opposite corner C_2, with a relatively large rotational energy. Such a second collision is such that it is as if a long, thin rod is held at one end thereof while the other end thereof collides with an object at a relatively small angle. Thus, the ceramic package 20 is subjected to a large tension force at the colliding surface thereof and, therefore, a generation of cracks is caused by the second collision.

The inventors have created the present invention on the basis of the above-mentioned knowledge obtained from their experiments.

Fig. 3 is a partial plan view of a ceramic package according to the present invention. The rectangular and plate-shaped ceramic package 20 comprises a base made of a material consisting essentially of ceramic and is provided at each corner portion C_0 thereof with a main bevel 23, which is the same as that of the prior art, and auxiliary bevels 24_1 and 24_2 positioned at the respective sides of the main bevel 23. Each auxiliary bevel 24_1,24_2 may be either a flat surface or a convex or rounded surface. Note, the surface of the main bevel 23 is not limited, and may be flat, round (R) or convex.

New corners 25_1 and 25_2 defined between these two auxiliary bevels 24_1 and 24_2 and the side walls W_1 and W_2 of this ceramic package 20, respectively, are postioned in areas A_1 and A_2 defined between vias $26b_1$ and $26b_2$ (lines D_1 and D_2) located nearest to the corner C_0 and an adjacent via 26a (lines E_1 and E_2) parallel to the walls W_2 and W_1, respectively. Note, advantageously each corner 25_1 or 25_2 is located as far away as possible from the vias, i.e., is located at a position on the side wall W_1, W_2 and between two vias (26a; $26b_1$, $26b_2$) in the vicinity of a corner C_0 of the ceramic package 20.

Here, "via" means any through hole, blind hole, cavity or the like at which stress is easily concentrated when the ceramic package 20 is subjected to an external force, such as a compression or tension force.

Although Fig. 3 illustrates only a part of the rectangular ceramic package 20, i.e., a portion of one C_0 of the corners, each of the other three corners is also provided with two auxiliary bevels as well as one main bevel, in the same manner as mentioned above.

In an embodiment shown in Fig. 4, in addition to the main bevel 23 and auxiliary bevels 24, sub bevels 26 may be formed between the front and rear surfaces S_1 and S_2 and the main bevel 23 and auxiliary bevels 24, respectively.

According to this invention, as the ceramic package 20 is provided at each corner C_0 thereof with a main bevel 23 and two auxiliary bevels 24, if the ceramic package 20 slides down, it first collides with a stopper surface at a corner 25a in Fig. 5. After one bounce, the ceramic package 20 again collides with the stopper surface at the opposite corner 25b. As clearly understood from Fig. 5, a distance X from a positon of the first collision, i.e., a corner 25a, to a position of the second collision, i.e., a corner 25b, is significantly reduced, compared with a distance Y from a corner 23a to a corner 23b which corresponds to a distance between the first and second positions of a collision in a ceramic package known in the prior art.

Consequently, according to the present invention, both of the positions of the first and second collisions 25a and 25b are located on the side wall at positions inward of the corner C_0 of the ceramic package 20. Therefore, a rotational moment exerted on the ceramic package 20 due to a reaction force of the first collision becomes smaller than that of the prior art. As a result, a rotational energy of the ceramic package 20 is reduced and, therefore, a tension force exerted on the package 20 at a second collision becomes significantly smaller, and thus a generation of cracks caused by the second collision is prevented.

Also, according to the above-mentioned embodiment, since the corners 25_1 and 25_2 in Fig. 3, i. e., the positions of collision, are located far from the vias, the exertion of a very large stress the vias is prevented and, therefore, the generation of cracks at these vias is prevented or reduced. It should be appreciated that, although the areas around the vias are generally weak, such weak points can be compensated.

Assuming that a single larger bevel was formed, as shown by a two-dot line in Fig. 6, to shift inside the positions of collision. i.e., corners 25, without an auxiliary bevel, an angle θ_2 (45 °) at the corners 25 would become much larger than the angle θ_1 at the corners 25 of the embodiment. Accordingly, stress would still be concentrated at the corners 25 of the angle θ_2, and such a solution would not completely prevent a generation of cracks.

Assuming also that a relatively large round or R-shaped bevel was formed, as shown in Fig. 7B, so that a tangent line of the R-shaped bevel was smoothly continued to the side walls of the ceramic package 20 to shift inside the tangent point, without auxiliary bevels, such a solution would not completely prevent a generation of cracks, since a position of the first collision is not definitely determined under the conditions of sliding down. Sometimes, a position of first collision may be on the R-shape portion, so that a distance between the positions of first and second collisions would become longer, and thus a relatively large stress might be exerted on the ceramic package 20.

The following table I shows experiments results, i.e., rate of crack generation number of samples with cracks, for samples of ceramic packages of an embodiment of this invention, a comparative example having a large R-shape bevel, and a prior art example, as shown in Figs. 7A, 7B, and 7C, respectively.

TABLE I

Samples \ Conditions	A	B
Embodiment	0 / 20	10 / 20
Comparative example	2 / 20	19 / 20
Prior art example	20 / 20	20 / 20

The samples of ceramic package 20 in Fig. 1 were dropped and slid down along the slope of a rail 21 and, then, hit on a steel block 22. The distance L of the slope along which was 30 cm in condition A and 60 cm in condition B. The angle θ of the slope was 60° . The samples were all ceramic packages used for a pin-grid array type semiconductor device. The rail 21 was made of acrylic and the steel block was made of tungsten carbide.

Fig. 8 shows experiments results for the samples of ceramic packages of a prior art example. On the other hand, Fig. 9 shows experiments results for the samples of ceramic packages of an embodiment of this inven-

tion.

As understood from TABLE I and Figs. 8 and 9, according to the embodiment of this invention, the crack generation rate was significantly reduced, compared with the prior art and the comparative example.

In the embodiment of a ceramic package as mentioned above, the angle of the main bevel 23 with respect to the side wall of the ceramic package 20 is approximately 45 ° . On the other hand, the angle (θ_1 in Fig. 6) of the auxiliary bevels 24 with respect to the side walls of the ceramic package 20 can be determined as follows.

Assuming that, in an accommodation or storage station, the ceramic packages 20 are fed or slid downward in tandem along a guide means such as a rail having side walls which define small gaps with respect to the side edges of the ceramic package 20. Due to these gaps, the ceramic package swings transversely while sliding downward along the rail.

Here, assuming that a maximum swing angle is α in Fig. 10, the angle θ_1 in Fig. 6 of the auxiliary bevels 24 with respect to the side walls should not be smaller than α, i.e., $\theta_1 \geqq \alpha$.

In this case, as shown in Fig. 10, after the ceramic package 20 first collides with the stopper surface and then bounces away therefrom, it collides again with the stopper surface of the other corner. Under the above conditions the force of, such a second collision is taken by the corner 25 of the auxiliary bevel 24, or at least by the entire face of the auxiliary bevel 24.

Assuming that such a second collision occurred at the corner 23a (Fig. 5), the crack generation rate would be increased, since the angle (approximately 45°) of the corner 23a is narrower than that of the corner 25. Therefore, according to the present invention, such a severe collision by the corner 23a (Fig. 5) can be avoided.

For example, if a maximum swing angle (α) of the ceramic package in the accommodation station is 2°, the complementary angle θ_3 in Fig. 6 at the corner 25 is preferably 178° or slightly smaller. In addition, a subsequent ceramic package might be swung in the opposite direction with respect to a preceding ceramic package. Therefore, advantageously, from the viewpoint of safety, the complementary angle θ_3 in Fig. 6 at the corner 25 is 176° or slightly smaller

Fig. 11 and the following TABLE II show dimensions of a typical embodiment of a ceramic package according to the present invention.

TABLE II

	Control Data	Measurement Data		
		max	min	avg
Dimension A (Smooth chamfer)	2.0~5.0mm (80~20 mil)	4.4mm (173 mil)	2.9mm (114 mil)	3.7mm (144 mil)
Angle of θ_1	2 ± 1°	2.5°	1.2°	1.7°

Various changes and modifications may be made in the invention, for example, this invention can be applied to various types of packages having a ceramic base used for mounting a semiconductor chip, such as a pin-grid array type package, or chip-carrier type package.

Claims

1. A ceramic package for mounting thereon an electric element, such as a semiconductor chip, and comprising a plate-shaped base made of a material consisting essentially of ceramic, said base having, in a plan view, at least one corner portion (C_0) located between two adjacent side walls, wherein said corner portion (C_0) comprises a main bevel (23), characterized in that said corner portion further comprises:

   at least two auxiliary bevels (24_1, 24_2) located at respective sides of said main bevel and extending to said two side walls (W_1,W_2), respectively, so that two first corners (C_{11}, C_{12}) are defined between the said main bevel (23) and said auxiliary bevels, respectively, and two second corners (25_1, 25_2) are defined between said auxiliary bevels (24_1, 24_2) and said side walls (W_1,W_2) of the base, respectively.

2. A ceramic package as claimed in claim 1, wherein said two adjacent side walls (W_1, W_2) form an angle of approximately 90° therebetween, and these side walls (W_1, W_2) and said main bevel (23) form an angle of approximately 135° therebetween, respectively, so that each of said first and second corners (C_{11},

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In the embodiment of a ceramic package as mentioned above, the angle of the main bevel 23 with respect to the side wall of the ceramic package 20 is approximately 45 ° . On the other hand, the angle (θ_1 in Fig. 6) of the auxiliary bevels 24 with respect to the side walls of the ceramic package 20 can be determined as follows.

Assuming that, in an accommodation or storage station, the ceramic packages 20 are fed or slid downward in tandem along a guide means such as a rail having side walls which define small gaps with respect to the side edges of the ceramic package 20. Due to these gaps, the ceramic package swings transversely while sliding downward along the rail.

Here, assuming that a maximum swing angle is α in Fig. 10, the angle θ_1 in Fig. 6 of the auxiliary bevels 24 with respect to the side walls should not be smaller than α, i.e., $\theta_1 \geqq \alpha$.

In this case, as shown in Fig. 10, after the ceramic package 20 first collides with the stopper surface and then bounces away therefrom, it collides again with the stopper surface of the other corner. Under the above conditions the force of, such a second collision is taken by the corner 25 of the auxiliary bevel 24, or at least by the entire face of the auxiliary bevel 24.

Assuming that such a second collision occurred at the corner 23a (Fig. 5), the crack generation rate would be increased, since the angle (approximately 45°) of the corner 23a is narrower than that of the corner 25. Therefore, according to the present invention, such a severe collision by the corner 23a (Fig. 5) can be avoided.

For example, if a maximum swing angle (α) of the ceramic package in the accommodation station is 2°, the complementary angle θ_3 in Fig. 6 at the corner 25 is preferably 178° or slightly smaller. In addition, a subsequent ceramic package might be swung in the opposite direction with respect to a preceding ceramic package. Therefore, advantageously, from the viewpoint of safety, the complementary angle θ_3 in Fig. 6 at the corner 25 is 176° or slightly smaller

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Claims

1. A ceramic package for mounting thereon an electric element, such as a semiconductor chip, and comprising a plate-shaped base made of a material consisting essentially of ceramic, said base having, in a plan view, at least one corner portion (C_0) located between two adjacent side walls, wherein said corner portion (C_0) comprises a main bevel (23), characterized in that said corner portion further comprises:

at least two auxiliary bevels (24_1, 24_2) located at respective sides of said main bevel and extending to said two side walls (W_1,W_2). respectively, so that two first corners (C_{11}, C_{12}) are defined between the said main bevel (23) and said auxiliary bevels, respectively, and two second corners (25_1, 25_2) are defined between said auxiliary bevels (24_1, 24_2) and said side walls (W_1,W_2) of the base, respectively.

2. A ceramic package as claimed in claim 1, wherein said two adjacent side walls (W_1, W_2) form an angle of approximately 90° therebetween, and these side walls (W_1, W_2) and said main bevel (23) form an angle of approximately 135° therebetween, respectively, so that each of said first and second corners (C_{11},

C_{12};25_1,25_2)have an angle of more than 135°.

3. A ceramic package as claimed in claim 1 or 2, wherein said ceramic base has a plurality of vias (26a, $26b_1$, $26b_2$), such as through holes, blind holes, cavities or the like, including a first via (26a) located nearest to said corner portion (C_0) and at least one second via ($26b_1$, $26b_2$) adjacent to said first via, and said second corners (25_1,25_2) are positioned in areas (A_1,A_2) defined between two parallel lines (D_1,E_1; D_2,E_2) which pass through said first and second vias (26a, $26b_1$, $26b_2$), respectively, and are in parallel to said side wall (W_1,W_2).

4. A ceramic package as claimed in claim 3, wherein two second vias ($26b_1$, $26b_2$) are provided, one via ($26b_1$) being positioned on a second straight line (D_2) passing through said first via (26a) and in parallel to one (W_1) of said side wall, and the other via ($26b_2$) being positioned on a first straight line (D_1) passing through said first via (26a) and in parallel to the other side wall (W_2).

5. A ceramic package as claimed in claim 3 or 4, wherein one (25_1) of said second corners is positioned in an area (A_1) defined between said first straight line (D_1) and a line (E_1) passing through said one ($26b_1$) of the second vias and the other second corner (25_2) is positioned in an area (A_2) defined between said second straight line (D_2) and a line (E_2) passing through said other second vias ($26b_1$) and in parallel to the first side wall (W_1).

6. A ceramic package as claimed in any preceding claim, wherein a complementary angle of said second corner (25_1, 25_2) defined between said auxiliary bevel (24_1, 24_2) and said side wall (W_1,W_2) of the base is equal to or a little more than a maximum swing angle (α), provided that the swing angle is determined as follows: said ceramic package swings transversely while being fed along guide means at said swing angle, assuming that a plurality of said ceramic packages are fed or slide downward in tandem along said guide means which define small gaps with respect to the side walls of the ceramic package.

7. A ceramic package as claimed in any preceding claim, wherein said base has a front surface (S_1) and a rear surface (S_2) and sub bevels (26) are formed between said front surface (S_1) and said main bevel (23) and said auxiliary bevels (24), respectively, and between said rear surface (S_2) and said main bevel (23) and said auxiliary bevels (24), respectively.

8. A ceramic package as claimed in any preceding claim, wherein each of said auxiliary bevels (24) is a flat surface.

9. A ceramic package as claimed in any one of claims 1 to 7, wherein each of said auxiliary bevels (24) is a convex, rounded surface.

Patentansprüche

1. Keramische Packung, an der ein elektrisches Bauelement, beispielsweise ein Halbleiterchip, anbringbar ist und die eine plattenförmige Basis aus einem im wesentlichen aus Keramik bestehenden Werkstoff besitzt, wobei die genannte Basis, in Draufsicht gesehen, zumindest einen Eckbereich (C_o) aufweist, der zwischen zwei benachbarten Seitenwänden gelegen ist, wobei der genannte Eckbereich (C_o) eine Hauptabschrägung (23) aufweist, dadurch gekennzeichnet, daß der genannte Eckbereich außerdem aufweist:
zumindest zwei Hilfsabschrägungen (24_1, 24_2), die auf der einen bzw. anderen Seite der genannten Hauptabschrägung gelegen sind und sich zu den genannten zwei Seitenwänden (W_1 bzw. W_2) erstrecken, so daß zwei erste Ecken (C_{11}, C_{12}) zwischen der genannten Hauptabschrägung (23) und den genannten Hilfsabschrägungen und zwei zweite Ecken (25_1, 25_2) zwischen den genannten Hilfsabschrägungen (24_1, 24_2) und der einen bzw. anderen genannten Seitenwand (W_1 W_2) der Basis gebildet werden.

2. Keramische Packung nach Anspruch 1, bei der die genannten zwei benachbarten Seitenwände (W_1, W_2) zwischen sich einen Winkel von ungefähr 90° bilden und diese Seitenwände (W_1, W_2) und die genannte Hauptabschrägung (23) einen Winkel von jeweils ungefähr 135° zwischen sich bilden, so daß jede der genannten ersten und zweiten Ecken (C_{11}, C_{12}; 25_1, 25_2) einen Winkel von mehr als 135° besitzt.

3. Keramische Packung nach Anspruch 1 oder 2, bei der die genannte keramische Basis eine Mehrzahl von Durchgängen (26a, $26b_1$, $26b_2$), beispielsweise Durchgangslöcher, Sacklöcher, Hohlräume oder derglei-

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chen aufweist, einschließlich eines ersten Durchganges (26a), der dem genannten Eckbereich (C_o) nächstgelegen ist, und zumindest eines zweiten Durchganges ($26b_1$, $26b_2$), der dem genannten ersten Durchgang benachbart ist, und die genannten zweiten Ecken (25_1, 25_2) in Bereichen (A_1, A_2) gelegen sind, die zwischen zwei parallelen Linien (D_1, E_1;D_2, E_2) eingegrenzt sind, die durch den genannten ersten bzw. zweiten Durchgang (26a bzw. $26b_1$, $26b_2$) hindurch und parallel zur genannten Seitenwand (W_1, W_2) verlaufen.

4. Keramische Packung nach Anspruch 3, bei der zwei zweite Durchgänge ($26b_1$, $26b_2$) vorgesehen sind, von denen ein Durchgang ($26b_1$) an einer zweiten geraden Linie (D_2) gelegen ist, die durch den genannten ersten Durchgang (26a) hindurch und parallel zu einer (W_1) der genannten Seitenwände verläuft, und der andere Durchgang ($26b_2$) auf einer ersten geraden Linie (D_1) gelegen ist, die durch den genannten ersten Durchgang (26a) und parallel zur anderen Seitenwand (W_2) verläuft.

5. Keramische Packung nach Anspruch 3 oder 4, bei der eine (25_1) der genannten zweiten Ecken in einem Bereich (A_1) gelegen ist, der zwischen der genannten ersten geraden Linie (D_1) und einer Linie (E_1) eingegrenzt ist, die durch den genannten einen ($26b_1$) der zweiten Durchgänge verläuft, und die andere zweite Ecke (25_2) in einem Bereich (A_2) gelegen ist, der zwischen der genannten zweiten geraden Linie (D_2) und einer Linie (E_2) eingegrenzt ist, die durch den genannten anderen zweiten Durchgang ($26b_1$) und parallel zu der ersten Seitenwand (W_1) verläuft.

6. Keramische Packung nach einem der vorausgehenden Ansprüche, bei der ein komplementärer Winkel der genannten zweiten Ecke (25_1, 25_2), der zwischen der genannten Hilfsabschrägung (24_1, 24_2) und der genannten Seitenwand (W_1, W_2) der Basis definiert ist, gleich oder etwas größer ist als ein größter Schwenkwinkel α, vorausgesetzt, daß der Schwenkwinkel sich wie folgt bestimmt: die genannte keramische Packung schwenkt in Querrichtung, während sie längs Führungsmitteln geführt wird, um den genannten Schwenkwinkel, wobei angenommen wird, daß eine Mehrzahl der genannten keramischen Packungen in Tandem-Anordnung gefördert werden oder nach unten längs des genannten Führungsmittels gleiten, das schmale Zwischenräume gegenüber den Seitenwänden der keramischen Packung begrenzt.

7. Keramische Packung nach einem der vorausgehenden Ansprüche, bei der die genannte Basis eine vordere Oberfläche (S_1) und eine hintere Oberfläche (S_2) aufweist und Unterabschrägungen (26) zwischen der genannten vorderen Oberfläche (S_1) und der genannten Hauptabschrägung (23) bzw. den genannten Hilfsabschrägungen (24) sowie zwischen der genannten hinteren Oberfläche (S_2) und der genannten Hauptabschrägung (23) bzw. den genannten Hilfsabschrägungen (24) ausgebildet sind.

8. Keramische Packung nach einem der vorausgehenden Ansprüche, bei der jede der genannten Hilfsabschrägungen (24) eine ebene Fläche ist.

9. Keramische Packung nach einem der Ansprüche 1 bis 7, bei der jede der genannten Hilfsabschrägungen (24) eine konvexe, gerundete Fläche ist.

Revendications

1. Module céramique sur lequel un élément électrique, tel qu'une puce à semiconducteurs, est destiné à être monté, et comportant une embase en forme de plaque réalisée en une matière constituée essentiellement d'une céramique, ladite embase ayant, vu en plan, au moins une partie d'angle (C_0) située entre deux parois latérales adjacentes, ladite partie d'angle (C_0) comportant un biseau principal (23), caractérisé en ce que ladite partie d'angle comporte en outre :

   au moins deux biseaux auxiliaires (24_1, 24_2) situés sur des côtés respectifs dudit biseau principal et s'étendant jusqu'auxdites deux parois latérales (W_1, W_2), respectivement, de manière que deux premiers angles (C_{11}, C_{12}) soient définis entre ledit biseau principal (23) et lesdits biseaux auxiliaires, respectivement, et que deux seconds angles (25_1, 25_2) soient définis entre lesdits biseaux auxiliaires (24_1, 24_2) et lesdites parois latérales (W_1, W_2) de l'embase, respectivement.

2. Module céramique selon la revendication 1, dans lequel lesdites deux parois latérales adjacentes (W_1, W_2) forment un angle d'environ 90° entre elles, et ces parois latérales (W_1, W_2) et ledit biseau principal (23) forment un angle d'environ 135° entre eux, respectivement, de manière que chacun desdits premiers

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et seconds angles (C_{11}, C_{12} ; 25_1, 25_2) soit un angle de plus de 135°.

3. Module céramique selon la revendication 1 ou 2, dans lequel ladite embase céramique présente plusieurs communications (26a, $26b_1$, $26b_2$), telles que des trous traversants, des trous borgnes, des cavités ou analogues, comprenant une première communication (26a) la plus proche de ladite partie d'angle (C_0) et au moins une seconde communication ($26b_1$, $26b_2$) adjacente à ladite première communication, et lesdits seconds angles (25_1, 25_2) sont positionnés dans des zones (A_1, A_2) définies entre deux lignes parallèles (D_1, E_1 ; D_2, E_2) qui passent par lesdites première et seconde communications (26a, $26b_1$, $26b_2$), respectivement, et qui sont parallèles à ladite paroi latérale (W_1, W_2).

4. Module céramique selon la revendication 3, dans lequel deux secondes communications ($26b_1$, $26b_2$) sont prévues et une communication ($26b_1$) étant positionnée sur une seconde ligne droite (D_2) passant par ladite première communication (26a) et parallèle à l'une (W_1) desdites parois latérales, et l'autre communication ($26b_2$) étant positionnée sur une première ligne droite (D_1) passant par ladite première communication (26a) et parallèle à l'autre paroi latérale (W_2).

5. Module céramique selon la revendication 3 ou 4, dans lequel l'un (25_1) desdits seconds angles est positionné dans une zone (A_1) définie entre ladite première ligne droite (D_1) et une ligne (E_1) passant par ladite communication ($26b_1$) faisant partie des secondes communications et l'autre second angle (25_2) est positionné dans une zone (A_2) définie entre ladite seconde ligne droite (D_2) et une ligne (E_2) passant par lesdites autres secondes communications ($26b_1$) et parallèle à la première paroi latérale (W_1).

6. Module céramique selon l'une quelconque des revendications précédentes, dans lequel un angle complémentaire dudit second angle (25_1, 25_2) défini entre ledit biseau auxiliaire (24_1, 24_2) et ladite paroi latérale (W_1, W_2) de l'embase est égal ou légèrement supérieur à un angle maximal (α) d'oscillation, pourvu que l'angle d'oscillation soit déterminé de la manière suivante : ledit module céramique oscille transversalement pendant qu'il est avancé le long de moyens de guidage audit angle d'oscillation, en supposant que plusieurs desdits modules céramiques sont avancés ou descendent en glissant, ensemble, le long desdits moyens de guidage qui définissent de petits intervalles avec les parois latérales du module céramique.

7. Module céramique selon l'une quelconque des revendications précédentes, dans lequel ladite embase présente une surface avant (S_1) et une surface arrière (S_2) et des biseaux secondaires (26) sont formés entre ladite surface avant (S_1) et ledit biseau principal (23) et lesdits biseaux auxiliaires (24), respectivement, et entre ladite surface arrière (S_2) et ledit biseau principal (23) et lesdits biseaux auxiliaires (24), respectivement.

8. Module céramique selon l'une quelconque des revendications précédentes, dans lequel chacun desdits biseaux auxiliaires (24) est une surface plate.

9. Module céramique selon l'une quelconque des revendications 1 à 7, dans lequel chacun desdits biseaux auxiliaires (24) est une surface arrondie, convexe.