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### Method for forming power module package, power module package and electronic device

#### Abstract

A method for forming a power module package includes providing a power module including an electrical element and an electrical connection portion; providing an electrical connection terminal including a connection end, an extension portion and an end cap, wherein the extension portion is extended between the connection end and the end cap and has a hollow cavity therein; disposing the electrical connection terminal on the electrical connection portion for electrically connecting the connection end to a corresponding electrical connection portion; packaging the power module and the electrical connection terminal through an encapsulant to form a packaged body; removing a portion of a surface of the packaged body for exposing the end cap of the electrical connection terminal; and removing the end cap to expose the hollow cavity of the electrical connection terminal, so as to form the power module package.

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Patent No.	Application Date	Country	CPC
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## Background/Summary

### CROSS-REFERENCE TO RELATED APPLICATION

(1) This application claims priority to China Patent Application No. 202211467476.7 filed on Nov. 22, 2022. The entire contents of the above-mentioned patent application are incorporated herein by reference for all purposes.

### FIELD OF THE INVENTION

(2) The present disclosure relates to a technical field of electronic module packaging, and more particularly to a method for forming a power module package, the power module package and an electronic device including thereof.

### BACKGROUND OF THE INVENTION

(3) Electronic modules, such as, power modules, are usually packaged by an encapsulant, such as a filling and sealing material with a particular function, to form a specific appearance for further application. Through the packaging process, the circuitry of the power module is sealed within the encapsulant to form a packaged body.

(4) In order to extend the electrical connection of the internal circuitry to the surface of the packaged body, so as to provide the electrical connection with the external for the circuit system inside the package, the common method is to include leads, metal pins, conductive terminals and/or metal frames therein. Since these electrical connection structures are the bridging connections for the packaged power module to the external, a protection process is necessary for ensuring the integrity of the electrical connection structures after the packaging process.

(5) However, the inventors recognize that the current protection process may increase the difficulties in performing the packaging process.

#### SUMMARY OF THE INVENTION

(6) The present disclosure provides a method for forming a power module package, the power module package and an electronic device including thereof.

(7) In accordance with an aspect of the present disclosure, a method for forming a power module package is provided. The method includes providing a power module, wherein the power module includes at least one electrical element and at least one electrical connection portion; providing at least one electrical connection terminal, wherein each of the at least one electrical connection terminal includes a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end cap, and the extension portion includes a hollow cavity therein; disposing the at least one electrical connection terminal respectively and correspondingly on the at least one electrical connection portion, so as to electrically connect the connection end of each of the at least one electrical connection terminal to a corresponding electrical connection portion; packaging the power module and the at least one electrical connection terminal through an encapsulant to form a packaged body; removing at least one portion of a surface of the packaged body for exposing the end cap of each of the at least one electrical connection terminal; and removing the end cap to expose the hollow cavity of each of the at least one electrical connection terminal, so as to form the power module package.

(8) In accordance with another aspect of the present disclosure, a power module package is provided. The power module package includes a power module including at least one electrical element and at least one electrical connection portion; at least one electrical connection terminal correspondingly and respectively disposed on the at least one electrical connection portion, wherein each of the at least one electrical connection terminal includes a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end cap and includes a hollow cavity therein, and the connection end of each of the at least one electrical connection terminal is electrically connected to a corresponding electrical connection portion; and an encapsulant for packaging the power module and the at least one electrical connection terminal to form a packaged body, wherein at least one portion of a surface of the packaged body corresponding to each of the at least one electrical connection terminal is removed, and the end cap of each of the at least one electrical connection terminal is further removed to expose the hollow cavity of each of the at least one electrical connection terminal.

(9) In accordance with a further aspect of the present disclosure, an electronic device is provided. The electronic device includes a system circuit board and a power module package. The power module package includes a power module including at least one electrical element and at least one electrical connection portion; at least one electrical connection terminal respectively and correspondingly disposed on the at least one electrical connection portion, wherein each of the at least one electrical connection terminal includes a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end cap and includes a hollow cavity therein, and the connection end of each of the at least one electrical connection terminal is electrically connected to a corresponding electrical connection portion; and an encapsulant for packaging the power module and the at least one electrical connection terminal to form a packaged body, wherein at least one portion of a surface of the packaged body corresponding to each of the at least one electrical connection terminal is removed, and the end cap

of each of the at least one electrical connection terminal is further removed to expose the hollow cavity of each of the at least one electrical connection terminal. The power module package is electrically connected to the system circuit board through the at least one electrical connection terminal.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

(1) The above contents of the present disclosure will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying drawings, in which:

(2) FIGS. 1A to 1C are schematic views showing a process for forming a power module package according to some embodiments of the present disclosure;

(3) FIG. 1D is a flow chart showing a method for forming the power module package according to some embodiments of the present disclosure;

(4) FIG. 2A is a sectional view showing an electrical connection terminal in a first embodiment according to the present disclosure;

(5) FIG. 2B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the first embodiment according to the present disclosure;

(6) FIG. 2C is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. 2B;

(7) FIG. 3A is a sectional view showing an electrical connection terminal in a second embodiment according to the present disclosure;

(8) FIG. 3B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the second embodiment according to the present disclosure;

(9) FIG. 3C is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. 3B;

(10) FIG. 4A is a sectional view showing an electrical connection terminal in a third embodiment according to the present disclosure;

(11) FIG. 4B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the third embodiment according to the present disclosure;

(12) FIG. 4C is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. 4B;

(13) FIG. 5A is a sectional view showing an electrical connection terminal in a fourth embodiment according to the present disclosure;

(14) FIG. 5B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the fourth embodiment according to the present disclosure;

(15) FIG. 5C is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. 5B;

(16) FIG. 6A is a sectional view showing an electrical connection terminal in a fifth embodiment according to the present disclosure;

(17) FIG. 6B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the fifth embodiment according to the present disclosure;

(18) FIG. 6C is a schematic sectional view showing a power module package formed from the packaged body in FIG. 6B with solder balls disposed thereon; and

(19) FIGS. 7A to 7F are schematic views showing examples of external electrical connections for the power module package in the fifth embodiment according to the present disclosure.

### DETAILED DESCRIPTION OF THE INVENTION

(20) The present disclosure will now be described more specifically with reference to the following

embodiments. It is to be noted that the following descriptions of the embodiments are presented herein for purpose of illustration and description only. It is not intended to be exhaustive or to be limited to the precise form disclosed.

(21) Please refer to FIGS. **1A** to **1D**. FIGS. **1A** to **1C** are schematic views showing a process for forming a power module package according to some embodiments of the present disclosure, and FIG. **1D** is a flow chart showing a method for forming the power module package according to some embodiments of the present disclosure. First, in step **S1**, a power module **10** to be packaged is provided. The power module **10** includes a circuit board **11**, at least one electrical element **12**, and at least one electrical connection portion **13** for achieving an external electrical connection. In steps **S2** to **S3**, before packaging, an electrical connection terminal **20** is disposed on each of the at least one electrical connection portion **13** so as to form an electrical connection therebetween. Each electrical connection terminal **20** includes a connection end **21**, an extension portion **22**, an end cap **23**, and a hollow cavity **24** extended into the extension portion **22**, and the connection end **21** is electrically connected to the electrical connection portion **13**. In step **S4**, an encapsulant **31** is used to package the power module **10** and the electrical connection terminal **20** for forming a packaged body **30**. Then, in step **S5**, at least one portion of the surface of the packaged body **30** corresponding to location of the electrical connection terminal **20** is removed, so as to expose the end cap **23** of the electrical connection terminal **20**. In step **S6**, the exposed end cap **23** is also removed to expose the hollow cavity **24** of each electrical connection terminal **20**, thereby forming a power module package **40**.

(22) In other words, before the power module **10** is packaged, the electrical connection terminal **20** is already disposed on the power module **10** and electrically connected to the electrical connection portion **13**, and the electrical connection portion **13** is used to achieve the external electrical connection. Under this condition, since the electrical connection terminal **20** includes the end cap **23**, the hollow cavity **24** is reliably protected thereby during the packaging process. After the packaging is finished, a simple process of removing a portion of the surface of the packaged body **30** and also the end cap **23** can easily performed to provide a pathway for the power module **10** to achieve the external electrical connection.

(23) Generally, the formed power module package **40** is used in an electronic device and is electrically connected to a system circuit board of the electronic device through the exposed electrical connection terminal **20** after the removing process. Accordingly, the power module package **40** can perform a power and signal exchange with the external through the electrical connection terminal **20**, thereby achieving the purpose of transmitting electric energies and signals.

(24) The electrical connection terminal **20** is made of an electrical conductive material. In some embodiments, the electrical conductive material is a copper, and the connection between the connection end **21** and the electrical connection portion **13** can be fixed through welding, glue bonding and other possible methods. Therefore, through further cooperating with the end cap **23**, both the extension of electrical connection and the provision of protection function can be achieved effectively. Moreover, the end cap **23** and the extension portion **22** can be integrally formed as one single element, and alternatively, the end cap **23** and the extension portion **22** also can be combined together, for example, through engaging and adhering, so as to simplify the removing process for the end cap **23**. The extension portion **22** is in a form of column, and the shape of the cross-section thereof can be varied without limitation, such as a circle, an ellipse, a square circle, a square and so on. Furthermore, the process for removing the surface of the packaged body **30** and the end cap **23** can be achieved through a simple process, such as grinding or cutting, without requiring complicated steps, so that the influence on the power module **10** inside the packaged body **30** is minor.

(25) Therefore, the method for forming the power module package in the present disclosure is advantageous of capable of protecting the electrical connection portion **13** during the packaging process, employing a simple removing process, and having minor influence on the power module

10.

(26) As described above, after the end cap **23** is removed, the hollow cavity **24** extended into the extension portion **22** is exposed at the surface of the power module package **40**, and the present disclosure utilizes the hollow cavity **24** is utilized in to enhance the applicability of the formed power module package **40**. Follows are more detailed descriptions relating to the structure of the electrical connection terminal **20** and the application thereof.

(27) Please refer to FIGS. **2A** to **2C**. FIG. **2A** is a sectional view showing an electrical connection terminal in a first embodiment according to the present disclosure, FIG. **2B** is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the first embodiment according to the present disclosure, and FIG. **2C** is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. **2B**. In this embodiment, the hollow cavity **24a** of the electrical connection terminal **20a** penetrates the extension portion **22a**, namely, the extension portion **22a** is in a form of a hollow column. The end cap **23a** is covered on one end of the hollow column of the extension portion **22a** opposite to the connection end **21a**. The shape of the cross-section of the hollow column can be a circular ring shape, as shown in FIG. **2A**. In some embodiments, the shape of the cross-section of the hollow column can be other shapes, such as, a square ring shape, a round-square ring shape, or an oval ring shape.

(28) After portions of the surface of the packaged body **30** and the end caps **23a** are removed, as shown in FIG. **2C**, the hollow cavities **24a** of the electrical connection terminals **20a** are exposed at the surface of the power module package **40**, and the exposed hollow cavities **24a** are used to receive external connection terminals. For example, the external connection terminal can be a terminal pin **51** on an external system board **50**, or can be a pin terminal capable of inserting into the hollow cavity **24a**. The contact surface between the terminal pin **51** and the hole of the hollow cavity **24a** provides the electrical connection between the power module package **40** and the external system board **50**. In some embodiments, the external system board **50** can be a system circuit board in an electronic device or a circuit board in other external systems. Consequently, through the connection end **21a** of the electrical connection terminal **20a** connecting to the electrical connection portion **13** of the circuit board **11** and the terminal pin **51** contacting to the electrical connection terminal **20a**, the electrical connection between the external system board **50** and the circuit board **11** can be formed. In some embodiments, through selecting the inner diameter of the hollow cavity **24a** and the outer diameter of the external pin terminal, such as the terminal pin **51**, the two structures can have a tight engagement therebetween, thereby strengthening the fixing force and thus improving the stability of the formed electrical connection.

(29) Please refer to FIGS. **3A** to **3C**. FIG. **3A** is a sectional view showing an electrical connection terminal in a second embodiment according to the present disclosure, FIG. **3B** is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the second embodiment according to the present disclosure, and FIG. **3C** is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. **3B**. In this embodiment, the hollow cavity **24b** of the electrical connection terminal **20b** identically penetrates the extension portion **22b**, so the extension portion **22b** is similarly formed in a form of a hollow column. The end cap **23b** is covered on one end of the hollow column of the extension portion **22b** opposite to the connection end **21b**. The difference from the embodiment shown in FIGS. **2A-2C** is the inner wall of the hollow cavity **24b** has threads **25b** formed thereon, so that after portions of the surface of the packaged body **30** and the end caps **23b** are removed and the hollow cavities **24b** of the electrical connection terminals **20b** are exposed, the threads **25b** in the hollow cavities **24b** are also exposed. Accordingly, the mechanical fixing and the electrical connection between the electrical connection terminal **20b** and the external pin terminal can be achieved simultaneously through screwing. For example, as shown in FIG. **3C**, a connection head **601** of an external connection wire **60** can be screwed on the power module package **40** through

employing an external pin terminal, such as a screw bolt **61**, with threads corresponding to the threads **25b**. Alternatively, when the external system board **50** in FIG. **2C** has through holes disposed thereon, it also can be fixed on the surface of the power module package **40** through passing therethrough the external pin terminals with threads to tightly screw with the threads **25b**. (30) Please refer to FIGS. **4A** to **4C**. FIG. **4A** is a sectional view showing an electrical connection terminal in a third embodiment according to the present disclosure, FIG. **4B** is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the third embodiment according to the present disclosure, and FIG. **4C** is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. **4B**. In this embodiment, the hollow cavity **24c** of the electrical connection terminal **20c** identically penetrates the extension portion **22c**, so the extension portion **22c** is similarly formed in a form of a hollow column. The end cap **23c** is covered on one end of the hollow column of the extension portion **22c** opposite to the connection end **21c**. In this embodiment, an electrical connection fixing element is pre-set in the hollow cavity **24c**. In some embodiments, the electrical connection fixing element can be a spring-engaging structure **26c** which provides the fixing force through the structure and the material elasticity thereof. Under this condition, after portions of the surface of the packaged body **30** and the end caps **23c** are removed and the hollow cavities **24c** of the electrical connection terminals **20c** are exposed, the spring-engaging structures **26c** are also exposed, so that the mechanical fixing and the electrical connection with the external pin terminal can be achieved simultaneously through spring-engaging. For example, the external pin terminal can be a mating terminal **70**, as shown in FIG. **4C**, for being inserted into the spring-engaging structure **26c** inside the hollow cavity **24c**. Alternatively, the terminal pin **51** of the external system board **50** as shown in FIG. **2C** also can be fixed through engaging with the spring-engaging structure **26c**. That is, as long as the diameter of the inserted terminal or pin is within the engaging range of the electrical connection fixing element inside the electrical connection terminal **20c**, the engagement for the inserted terminal or pin can be achieved, thereby forming the electrical connection. Further, the electrical connection fixing element also can be implemented into other types of structures, there is no limitation.

(31) Please refer to FIGS. **5A** to **5C**. FIG. **5A** is a sectional view showing an electrical connection terminal in a fourth embodiment according to the present disclosure, FIG. **5B** is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the fourth embodiment according to the present disclosure, and FIG. **5C** is a schematic view showing an external connection of a power module package formed from the packaged body in FIG. **4B**. In this embodiment, the connection end **21d** of the electrical connection terminal **20d** is a solid plane, and the extension portion **22d** is a solid column extended from the connection end **21d** to the end cap **23d**. In some embodiments, the shape of the cross-section of the hollow column can be a circular shape, a square shape, a round-square shape, or an oval shape. In other words, different from the embodiments above, the hollow cavity **24d** does not penetrate the extension portion **24d**, but only occupies a portion of the extension portion **24** adjacent to the end cap **24d**. Further, a solder material **27d** is filled in the hollow cavity **24d**, so that after portions of the surface of the packaged body **30** and the end caps **23d** are removed and the hollow cavities **24d** of the electrical connection terminals **20d** are exposed, the solder materials **27d** in the hollow cavities **24d** are also exposed. Accordingly, the external electrical connection of the electrical connection terminal **20d** can be achieved through welding. For example, after the exposed solder material **27d** is heated and melted, as shown in FIG. **5C**, a plug-in terminal **602** of the external connection wire **60** can be directly inserted into the melted solder material **27d** to complete the electrical connection. Alternatively, the connection head **601** as shown in FIG. **3C** which has a flat shape also can form the electrical connection through a flat welding, such as, through the surface mount technology (SMT). Since the solder material **27d** is in a fluid state after being heated and melted, the electrical connection terminal **20d** can adapt to more diverse and extensive types of external connections.

(32) Please refer to FIGS. 6A to 6C. FIG. 6A is a sectional view showing an electrical connection terminal in a fifth embodiment according to the present disclosure, FIG. 6B is a sectional view of the A-A' plane of the electrical connection terminal as being disposed in a packaged body in the fifth embodiment according to the present disclosure, and FIG. 6C is a schematic sectional view showing a power module package formed from the packaged body in FIG. 6B with solder balls disposed thereon. In this embodiment, identically, the connection end **21e** of the electrical connection terminal **20e** is a solid plane, the extension portion **22e** is a column extended from the connection end **21e** to the end cap **23e**, and the hollow cavity **24e** is within the extension portion **24e** at a location adjacent to the end cap **24e**. Different from the embodiment in FIGS. 5A-5C, in this embodiment, the hollow cavity **24e** remains empty until the end cap **23e** is removed.

(33) As shown in FIG. 6C, after portions of the surface of the packaged body **30** and the end caps **23e** are removed, one or more hollow cavities **24e** of the electrical connection terminals **20e** are exposed at the surface of the power module package **40**, which makes the surface of the power module package **40** have one or more recesses. This result structure is suitable for externally adding the solder. For example, in the embodiment shown in FIG. 6C, each exposed hollow cavity **24e** can accommodate exactly one solder ball **80**. In other words, the hollow cavity **24** provides a space for receiving the solder ball **80** when the solder ball **80** passes through the surface of the power module package **40**. In some embodiments, the hollow cavity **24e** is implemented to have an arc bottom surface for receiving the solder ball having a diameter smaller than that of the arc bottom surface, namely, a portion of the surface of the solder ball **80** will be matched with the arc bottom surface.

(34) There are many advantages of employing the solder ball **80**. Firstly, since the solder ball **80** is added after the power module package **40** is formed, the amount of the solder material for welding can be adjusted through selecting from the solder balls **80** in different sizes to match the required amount for welding with different objects, which provides the flexibility. Moreover, the portion of the solder ball **80** protruding from the surface of the power module package **40** can provide additional solder material at the welding location after being heated and melted, which helps to enhance the reliability after welding. Further, because the solder ball **80** becomes the melted solder material after being heated, it is beneficial to effectively form the electrical connection with different types of external connections.

(35) Please refer to FIGS. 7A-7F which are schematic views showing examples of external electrical connections for the power module package in the fifth embodiment according to the present disclosure. In one situation, the power module package **40** directly forms the external electrical connection through the solder ball **80**. As shown in FIG. 7A, the solder balls **80** in each of the hollow cavities **80** are correspondingly matched with the pads **52** on the surface of the external system board **50**, so that the two can directly welded through a welding process, thereby forming the electrical connection. Further, as shown in FIG. 7B, the external system board **50** can have the terminal pin **51** disposed thereon, so that after the solder ball **80** is heated and melted, the electrical connection can be formed through inserting the terminal pin **51**. Alternatively, as shown in FIG. 5C, the electrical connection for the plug-in terminal **602** of the external connection wire **60** also can be welded through inserting, thereby forming the electrical connection. In addition, the connection head **601** of the external connection wire **60** as shown in FIG. 3C can be welded through the surface mount technology.

(36) In another situation, the power module package **40** forms the external electrical connection through adopting a bridging terminal. As shown in FIGS. 7C-7D, a bridging terminal **90a** includes a pin end **901a**, a support portion **902a** and a tail end **903a**. The pin end **901a** is used to insert into the melted solder material formed by heating the solder ball **80**, and after cooling, the bridging terminal **90a** becomes a portion of the external electrical connection of the power module package **40**. The tail end **903a** is used to penetrate a through hole **53** of the external system board **50** and also to be welded with the external system board **50**. The support portion **902a** has a support surface **904a** for supporting the external system board **50**. Further, as shown in FIGS. 7E-7F, as



cooperating with the system board **50** without the through hole, a bridging terminal **90b** without the tail end can be used. The bridging terminal **90b** includes a pin end **901b** for inserting into the melted solder material, and a support portion **902b** having a support surface **904b**. Other than supporting the external system board **50**, the support surface **904b** is also used to be welded with the pad on the external system board **50**, e.g., through the surface mount technology, so as to form the electrical connection.

(37) The disposition of the bridging terminal is also suitable for the embodiment shown in FIGS. 5A-5C, in which the solder material **27d** pre-set in the hollow cavity **24d** also can be used to be welded with the bridging terminal.

(38) Through the additional disposition of the bridging terminal, the application of the power module package **40** of the present disclosure can be increased. Since the type of the external connection of the formed power module package **40** is determined through the electrical connection terminal **20** pre-set therein, the externally added bridging terminal provides the possibility to change the way to achieve the connection. That is, through this design, it only needs to change the bridging terminal, and the existed power module package **40** can therefore provide a different kind of external connection, which eliminates the need to re-form a power module package with different electrical connection terminal **20**, and thus can quickly respond to the connection and/or installation requirement as the external connection is changed. For example, when the connection structure on the external system board is changed, e.g., when the external system boards of different clients adopt different connection structures, through employing a corresponding bridging terminal, e.g., selected from bridging terminals for respective clients, the electrical connection still can be achieved. Furthermore, the installation requirements for different system circuit boards in the electronic device might be different, and it is possible to control the distance between the external system board **50** and the power module package **40** through adjusting the height of the support portion, thereby achieving a more effective utilization of the space within the electronic device. Consequently, through the additional disposition of the bridging terminal, one single kind of power module package **40** can be cooperated with multiple kinds of external systems, which advantageously provides the flexibility.

(39) In addition, other than extending the electrical connection portion **13** from the internal circuit board to the surface of the power module package **40**, the electrical connection terminal, based on the property of the material thereof, also can achieve the effect of transmitting heats generated inside the power module **10** to the external.

(40) In conclusion, through pre-setting the electrical connection terminal with self-protection function in the power module before packaging, the present disclosure eliminates the need of executing an additional protection process during packaging. Moreover, after the packaging process is finished, it only needs to perform a simple removing process on the packed body, and the portion of the electrical connection terminal for achieving the electrical connection can be easily exposed. Not only the process is simple and the extension of electrical connection can be achieved effectively, the influence on the power module is also minimized. Furthermore, through varying the structure of the electrical connection terminal and cooperating with the bridging terminal, it also can effectively adopt to the requirements of different kinds of external connections, which is a design with application flexibility.

(41) While the disclosure has been described in terms of what is presently considered to be the most practical and preferred embodiments, it is to be understood that the disclosure needs not be limited to the disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims which are to be accorded with the broadest interpretation so as to encompass all such modifications and similar structures.

## Claims

1. A method for forming a power module package, comprising: providing a power module, wherein the power module comprises at least one electrical element and at least one electrical connection portion; providing at least one electrical connection terminal, wherein each of the at least one electrical connection terminal comprises a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end cap, and the extension portion comprises a hollow cavity therein; disposing the at least one electrical connection terminal respectively and correspondingly on the at least one electrical connection portion, so as to electrically connect the connection end of each of the at least one electrical connection terminal to a corresponding electrical connection portion; packaging the power module and the at least one electrical connection terminal through an encapsulant to form a packaged body; removing at least one portion of a surface of the packaged body for exposing the end cap of each of the at least one electrical connection terminal; and removing the end cap to expose the hollow cavity of each of the at least one electrical connection terminal, so as to form the power module package.
2. The method for forming the power module package as claimed in claim 1, wherein the hollow cavity of each of the at least one electrical connection terminal is adjacent to the end cap and occupies a portion of the extension portion.
3. The method for forming the power module package as claimed in claim 2, wherein the exposed hollow cavity of each of the at least one electrical connection terminal further receives at least one portion of a solder ball, and the at least one electrical connection terminal forms an external electrical connection through the solder ball.
4. The method for forming the power module package as claimed in claim 3, wherein the external electrical connection is formed by the at least one electrical connection terminal and the solder ball through at least one of a surface mount technology and a pin welding.
5. The method for forming the power module package as claimed in claim 3, wherein the solder ball received in the hollow cavity is electrically connected to a bridging terminal, and the bridging terminal is used to form the external electrical connection.
6. The method for forming the power module package as claimed in claim 2, wherein the hollow cavity of each of the at least one electrical connection terminal contains a solder material pre-set therein, and the solder material is exposed as the hollow cavity is exposed.
7. The method for forming the power module package as claimed in claim 1, wherein the hollow cavity of each of the at least one electrical connection terminal penetrates the extension portion for receiving an external pin terminal.
8. The method for forming the power module package as claimed in claim 7, wherein an inner wall of the hollow cavity has threads disposed thereon for fixing the external pin terminal through screwing.
9. The method for forming the power module package as claimed in claim 7, wherein the hollow cavity of each of the at least one electrical connection terminal contains an electrical connection fixing element pre-set therein, and the electrical connection fixing element is exposed while the hollow cavity is exposed, so as to fix the external pin terminal through engaging therebetween.
10. The method for forming the power module package as claimed in claim 1, wherein the at least one electrical connection terminal is further used to transmit a heat generated inside the power module package.
11. A power module package, comprising: a power module comprising at least one electrical element and at least one electrical connection portion; at least one electrical connection terminal correspondingly and respectively disposed on the at least one electrical connection portion, wherein each of the at least one electrical connection terminal comprises a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end

cap and comprises a hollow cavity therein, and the connection end of each of the at least one electrical connection terminal is electrically connected to a corresponding electrical connection portion; and an encapsulant for packaging the power module and the at least one electrical connection terminal to form a packaged body, wherein at least one portion of a surface of the packaged body corresponding to each of the at least one electrical connection terminal is removed, and the end cap of each of the at least one electrical connection terminal is further removed to expose the hollow cavity of each of the at least one electrical connection terminal.

12. The power module package as claimed in claim 11, wherein the hollow cavity of each of the at least one electrical connection terminal is adjacent to the end cap and occupies a portion of the extension portion.

13. The power module package as claimed in claim 12, wherein the exposed hollow cavity of each of the at least one electrical connection terminal further receives at least one portion of a solder ball, and the at least one electrical connection terminal forms an external electrical connection through the solder ball.

14. The power module package as claimed in claim 13, wherein the external electrical connection is formed by the at least one electrical connection terminal and the solder ball through at least one of a surface mount technology and a pin welding.

15. The power module package as claimed in claim 13, wherein the solder ball received in the exposed hollow cavity is electrically connected to a bridging terminal, and the bridging terminal is used to form the external electrical connection.

16. The power module package as claimed in claim 12, wherein the hollow cavity of each of the at least one electrical connection terminal contains a solder material pre-set therein, and the solder material is exposed as the hollow cavity is exposed.

17. The power module package as claimed in claim 11, wherein the hollow cavity of each of the at least one electrical connection terminal penetrates the extension portion for receiving an external pin terminal.

18. The power module package as claimed in claim 17, wherein an inner wall of the hollow cavity has threads disposed thereon for fixing the external pin terminal through screwing.

19. The power module package as claimed in claim 17, wherein the hollow cavity of each of the electrical connection terminal contains an electrical connection fixing element preset therein, and the electrical connection fixing element is exposed while the hollow cavity is exposed, so as to fix the external pin terminal through engaging therebetween.

20. An electronic device, comprising: a system circuit board; and a power module package, comprising: a power module comprising at least one electrical element and at least one electrical connection portion; at least one electrical connection terminal respectively and correspondingly disposed on the at least one electrical connection portion, wherein each of the at least one electrical connection terminal comprises a connection end, an extension portion and an end cap, the extension portion is extended between the connection end and the end cap and comprises a hollow cavity therein, and the connection end of each of the at least one electrical connection terminal is electrically connected to a corresponding electrical connection portion; and an encapsulant for packaging the power module and the at least one electrical connection terminal to form a packaged body, wherein at least one portion of a surface of the packaged body corresponding to each of the at least one electrical connection terminal is removed, and the end cap of each of the at least one electrical connection terminal is further removed to expose the hollow cavity of each of the at least one electrical connection terminal, wherein the power module package is electrically connected to the system circuit board through the at least one electrical connection terminal.

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