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Module

Abstract

The module includes a substrate, a first component mounted on a first surface, a first sealing resin, and a first shield film. When viewed in a cross section taken along a plane perpendicular to the first surface, the substrate is formed with a step portion. The substrate includes a first extraction electrode disposed to be exposed to the step portion. The first extraction electrode is connected to a first shield film. The first shield film includes one or more thick portions having a film thickness greater than that of the other portions in the step portion.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATION (1) This is a continuation of International Application No. PCT/JP2021/017895 filed on May 11, 2021 which claims priority from Japanese Patent Application No. 2020-101186 filed on Jun. 10, 2020. The contents of these applications are incorporated herein by reference in their entireties.

BACKGROUND OF THE DISCLOSURE
Field of the Disclosure
(1) The present disclosure relates to a module.
Description of the Related Art
(2) Japanese Patent No. 4530110 (PTL 1) describes an example method of manufacturing a module. In PTL 1, in order to manufacture a plurality of modules, after mounting components on a surface of an aggregate substrate which corresponds to the plurality of modules and forming a sealing resin layer, the aggregate substrate is diced into individual products. At this time, the aggregate substrate is not completely cut to the entire thickness but only to a halfway of the entire thickness. In this state, a shield film is formed, and then the aggregate substrate is completely cut into individual modules. PTL 1: Japanese Patent No. 4530110
BRIEF SUMMARY OF THE DISCLOSURE
(3) In the manufacturing method described in PTL 1, by cutting the substrate to a halfway of the entire thickness to expose a ground electrode and connect the ground electrode to a shield film to be provided later, it is possible to ensure the shielding performance of the module. Further, a step portion is formed to surround the outer periphery of the module, and the shield film is formed to cover the step portion. The ground electrode configured to ground the shield film may be exposed in the vicinity of the step portion. When the side surfaces of the sealing resin layer and the substrate are perpendicular to each other, the shield film formed by sputtering tends to become thinner downward, which may make the connection between the ground electrode exposed to the side surface of the substrate and the shield film insufficient.
(4) Accordingly, an object of the present disclosure is to provide a module having a sufficiently stable electrical connection between a ground electrode and a shield film.
(5) In order to achieve the object mentioned above, a module according to the present disclosure includes: a substrate having a first surface; a first component mounted on the first surface; a first sealing resin disposed to cover the first surface and the first component; and a first shield film that covers at least a part of an upper surface and a side surface of the first sealing resin and a side surface of the substrate. When viewed in a cross section taken along a plane perpendicular to the first surface, the substrate is formed with a step portion. The substrate includes a first extraction electrode disposed to be exposed to the step portion. The first extraction electrode is connected to the first shield film. The first shield film includes one or more thick portions having a film thickness greater than that of the other portions in the step portion.
(6) According to the present disclosure, since a step portion is provided in the substrate, the first extraction electrode is disposed to be exposed to the step portion, and the first shield film includes a thick portion in the step portion, it is possible to make the electrical connection between the extraction electrode and the shield film sufficiently stable.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

(1) FIG. **1** is a planar view illustrating a module according to a first embodiment of the present disclosure;

(2) FIG. **2** is a cross-sectional view taken along a line II-II in FIG. **1**;

(3) FIG. **3** is a cross-sectional view taken along a line III-III in FIG. **1**;

(4) FIG. **4** is an explanatory view illustrating a first step of a method of manufacturing the module according to the first embodiment of the present disclosure;

(5) FIG. **5** is an explanatory view illustrating a second step of the method of manufacturing the module according to the first embodiment of the present disclosure;

(6) FIG. **6** is an explanatory view illustrating a third step of the method of manufacturing the module according to the first embodiment of the present disclosure;

(7) FIG. **7** is an explanatory view illustrating a fourth step of the method of manufacturing the module according to the first embodiment of the present disclosure;

(8) FIG. **8** is an explanatory view illustrating a fifth step of the method of manufacturing the module according to the first embodiment of the present disclosure;

(9) FIG. **9** is an explanatory view illustrating a sixth step of the method of manufacturing the module according to the first embodiment of the present disclosure;

(10) FIG. **10** is a sectional view illustrating a module according to a second embodiment of the present disclosure;

(11) FIG. **11** is a sectional view illustrating a module according to a third embodiment of the present disclosure;

(12) FIG. **12** is a first cross-sectional view illustrating a module according to a fourth embodiment of the present disclosure;

(13) FIG. **13** is a second cross-sectional view illustrating the module according to the fourth embodiment of the present disclosure;

(14) FIG. **14** is a first cross-sectional view illustrating a module according to a fifth embodiment of the present disclosure;

(15) FIG. **15** is a second cross-sectional view illustrating the module according to the fifth embodiment of the present disclosure;

(16) FIG. **16** is a first cross-sectional view illustrating a module according to a sixth embodiment of the present disclosure;

(17) FIG. **17** is a second cross-sectional view illustrating the module according to the sixth embodiment of the present disclosure;

(18) FIG. **18** is a first cross-sectional view illustrating a module according to a seventh embodiment of the present disclosure;

(19) FIG. **19** is a second cross-sectional view illustrating the module according to the seventh embodiment of the present disclosure;

(20) FIG. **20** is a first cross-sectional view illustrating a module according to an eighth embodiment of the present disclosure; and

(21) FIG. **21** is a second cross-sectional view illustrating the module according to the eighth embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE DISCLOSURE

(22) Components in the drawings may not be drawn to scale, and may be exaggerated for the convenience of explanation. In the following description, when an upper position or a lower position is mentioned, it does not necessarily mean an absolutely upper or lower position, and it may mean a relatively upper or lower position in the illustrated posture.

First Embodiment

(23) A module according to a first embodiment of the present disclosure will be described with reference to FIGS. **1** to **3**. FIG. **1** is a planar view illustrating a module **101** according to the present

embodiment. In FIG. **1**, the right side is a first side **81**, and the upper side is a second side **82**. FIG. **2** is a cross-sectional view taken along a line II-II in FIG. **1**. FIG. **3** is a cross-sectional view taken along a line III-III in FIG. **1**.

(24) The module **101** includes a substrate **1** having a first surface **1***a*, a component **3***a* mounted on the first surface **1***a* as a first component, a first sealing resin **6***a* disposed to cover the first surface **1***a* and the component **3***a*, and a first shield film **8***a* that covers at least a part of an upper surface and a side surface of the first sealing resin **6***a* and a side surface of the substrate **1**. In the present embodiment, the first shield film **8***a* covers the entire side surface of the substrate **1**. In addition to the component **3***a*, another component may be mounted on the first surface **1***a*. For example, a component **3***b* may be mounted on the first surface **1***a*. In the present embodiment, it is assumed that the component **3***a* is a first component. In the drawings, all the mounted components are not necessarily denoted by reference numerals.

(25) The substrate **1** has a second surface **1***b* opposite to the first surface **1***a*. A pad electrode **15** is disposed on the second surface **1***b*. The pad electrode **15** functions as an external connection terminal and is used when the module **101** is mounted on a mother substrate or the like. A pad electrode **14** is disposed on the first surface **1***a*, and the component **3***a* and the like are electrically connected to the substrate **1** using the pad electrode **14**.

(26) When viewed in a cross section taken along a plane perpendicular to the first surface **1***a*, in other words, when viewed in FIG. **2** or **3**, the substrate **1** is formed with a step portion **54**. A side surface of a portion where the first sealing resin **6***a* and the substrate **1** are joined together includes a first portion **51** which serves as a part of the side surface of the substrate **1**, a second portion **52** which includes the side surface of the first sealing resin **6***a* and is located at a position receded from the first portion **51**, and a step portion **54** which is located between the first portion **51** and the second portion **52** and at which the side surface of the substrate **1** is perpendicular to the first surface **1***a*. As illustrated in FIG. **2**, the substrate **1** includes a first extraction electrode **71** disposed to be exposed to the step portion **54**. The first extraction electrode **71** is connected to the first shield film **8***a*. In the step portion **54**, the first shield film **8***a* includes one or more thick portions **25**, the thickness of which is locally greater in a direction parallel to the first surface **1***a*, i.e., in a direction along an arrow **91**. In other words, the film thickness of the first shield film **8***a* in the step portion **54** is greater than that of the other portions. The “film thickness” of the first shield film **8***a* in the thick portion refers to a thickness in a direction parallel to the first surface **1***a*, i.e., in a direction along the arrow **91**. The film thickness of the first shield film **8***a* in the thick portion is preferably 1.5 times or more as large as the film thickness of the first shield film **8***a* in any portion other than the thick portion. In the example illustrated in the present embodiment, each of the first side **81** and the second side **82** independently includes a combination of the first portion **51**, the second portion **52**, and the step portion **54**.

(27) The substrate **1** includes a first extraction electrode **71** (see FIG. **2**) disposed to be exposed to the step portion **54** at the first side **81**, and a second extraction electrode **72** (see FIG. **3**) disposed to be exposed to the step portion **54** at the second side **82**. The first extraction electrode **71** and the second extraction electrode **72** are connected to the first shield film **8***a*, respectively. In the present embodiment, the position of the second extraction electrode **72** in a height direction is different from the position of the first extraction electrode **71** in the height direction, but this is merely an example. The position of the second extraction electrode **72** in the height direction may be the same as the position of the first extraction electrode **71** in the height direction.

(28) In the present embodiment, since the first extraction electrode **71** is disposed to be exposed to the step portion **54**, and the first shield film **8***a* includes the thick portion **25** in the step portion **54**, it is possible to make the electrical connection between the extraction electrode and the shield film sufficiently stable.

(29) As described in the present embodiment, the module **101** preferably has the following configuration. The substrate **1** has the first side **81** and the second side **82**, and the first extraction

electrode **71** is disposed to be exposed to the step portion **54** at the first side **81**. Further, the substrate **1** includes the second extraction electrode **72** disposed to be exposed to the step portion **54** at the second side **82**. The position of the second extraction electrode **72** in the height direction is different from the position of the first extraction electrode **71** in the height direction. The first extraction electrode, the second extraction electrode and the first shield film are connected to a ground potential.

(30) (Manufacturing Method)

(31) A method of manufacturing the module **101** will be described with reference to FIGS. **4** to **9**. First, as illustrated in FIG. **4**, a substrate **1** is prepared. In the present embodiment, the substrate **1** is an aggregate substrate. In other words, the substrate **1** has a large area corresponding to a plurality of modules **101**. The substrate **1** has a first surface **1***a* and a second surface **1***b*. A pad electrode **14** is disposed on the first surface **1***a*. A pad electrode **15** is disposed on the second surface **1***b*.

(32) As illustrated in FIG. **5**, components are mounted on the first surface **1***a*. In the present embodiment, components **3***a*, **3***b* and the like are mounted on the first surface **1***a*. Next, as illustrated in FIG. **6**, a first sealing resin **6***a* is disposed. The first sealing resin **6***a* may be formed by molding.

(33) As illustrated in FIG. **7**, a trench **20** is formed along the boundaries of each module. The trench **20** may be formed by using a dicing machine. The trench **20** is formed to completely split the first sealing resin **6***a* but cut into the substrate **1** halfway in the thickness direction. Forming a trench **20** in this manner is also referred to as "half cutting". In the present embodiment, the trench **20** is formed to expose the extraction electrode in the substrate **1** to the portion exposed by dicing.

(34) As illustrated in FIG. **8**, a plating film **23** is grown on the bottom of the trench **20**.

(35) As illustrated in FIG. **9**, the aggregate substrate is cut into individual modules by using a dicing machine. In other words, cuts **21** are formed. Each cut **21** is formed to pass through the center of the trench **20**. The blade used in forming each cut **21** is thinner than the blade used in forming each trench **20**. The plating film **23** is also divided while the cut **21** is being formed. A sputtering process is performed on the individual module cut in this manner so as to form a sputtering film that covers the upper surface and the side surface of the first sealing resin **6***a*, the side surface of the substrate **1**, and the upper surface and the side surface of the plating film **23**. Thus, as illustrated in FIG. **2**, the first shield film **8***a* is formed. The divided plated film **23** illustrated in FIG. **9** is integrated with the sputtering film and becomes a part of the first shield film **8***a* in FIG. **2**. Since the divided plating film **23** is present at the step portion, the thickness of the first shield film **8***a* in the direction along the arrow **91** is locally greater. In other words, this portion becomes the thick portion **25**. Thus, the module **101** illustrated in FIGS. **1** to **3** can be obtained.

(36) Although a plating film is used to form a thick portion in the present embodiment, in consideration of the fact that the film thickness of the first shield film **8***a* in the thick portion is preferably 1.5 times or more the film thickness of the first shield film **8***a* in the other portions as described above, the thick portion may be formed by sputtering. Even when the sputtering is used, since the step portion is present, the thick portion may be formed accordingly.

Second Embodiment

(37) A module according to a second embodiment of the present disclosure will be described with reference to FIG. **10**. FIG. **10** is a cross-sectional view illustrating a module **102** according to the present embodiment. The module **102** is basically the same as the module **101** described in the first embodiment except the following configuration.

(38) In the module **102**, when viewed in a cross section taken along a plane perpendicular to the first surface **1***a*, the side surface of a portion where the first sealing resin **6***a* and the substrate **1** are joined together includes an inclined portion **55** where the side surface of the substrate **1** is inclined between the step portion **54** and the first surface **1***a*.

(39) Also in the present embodiment, the same effect as that described in the first embodiment may be obtained.

Third Embodiment

(40) A module according to a third embodiment of the present disclosure will be described with reference to FIG. **11**. FIG. **11** is a cross-sectional view illustrating a module **103** according to the present embodiment. The module **103** is basically the same as the module **102** described in the second embodiment except the following configuration.

(41) In the module **102**, the surface of the inclined portion **55** is a flat surface, but in the module **103** according to the present embodiment, the surface of the inclined portion **55** is a curved surface. In the cross-sectional view as illustrated in FIG. **11**, the surface of the inclined portion **55** is a circular surface.

(42) Also in the present embodiment, the same effect as that described in the second embodiment may be obtained.

Fourth Embodiment

(43) A module according to a fourth embodiment of the present disclosure will be described with reference to FIGS. **12** and **13**. FIG. **12** is a cross-sectional view illustrating a module **104** according to the present embodiment. FIG. **13** is a cross-sectional view illustrating the module **104** taken along a plane different from that of FIG. **12** by an orientation angle of 90°. The module **104** is basically the same as the module **101** described in the first embodiment except the following configuration.

(44) In the present embodiment, the substrate **1** has a plurality of step portions. In other words, the substrate **1** is formed with a first step portion **54***a* and a second step portion **54***b*. Each step portion has a thick portion. In the example illustrated in FIG. **12**, the first step portion **54***a* is provided with a thick portion **25***a*, and the second step portion **54***b* is provided with a thick portion **25***b*. In the present embodiment, first extraction electrodes **71***a* and **71***b* are disposed to be exposed to the side surface of the substrate **1**. The thick portion **25***a* is provided at a location to which the first extraction electrode **71***a* is exposed. The thick portion **25***b* is provided at a location to which the first extraction electrode **71***b* is exposed.

(45) As illustrated in FIG. **13**, a thick portion **25***c* is provided so as to correspond to the second extraction electrode **72**. It is apparent from the comparison of FIGS. **12** and **13** that the number of thick portions may vary on different sides in a planar view. This is merely an example. The number of thick portions may be the same in each side in a planar view.

(46) Also in the present embodiment, the same effect as that described in the first embodiment may be obtained. In the present embodiment, since the thick portions **25***a* and **25***b* are provided so as to correspond to each of the first extraction electrodes **71***a* and **71***b*, it is possible to make the electrical connection between each of the first extraction electrodes and the shield film sufficiently stable.

Fifth Embodiment

(47) A module according to a fifth embodiment of the present disclosure will be described with reference to FIGS. **14** and **15**. FIG. **14** is a cross-sectional view illustrating a module **105** according to the present embodiment. FIG. **15** is a cross-sectional view illustrating the module **105** taken along a plane different from that of FIG. **14** by an orientation angle of 90°. The module **105** is basically the same as the module **101** described in the first embodiment except the following configuration.

(48) In the module **105**, the substrate **1** has a second surface **1***b* facing opposite to the first surface **1***a*. The module **105** includes a second sealing resin **6***b* disposed to cover the second surface **1***b*. The first shield film **8***a* extends to cover a side surface of the second sealing resin **6***b*. The second surface **1***b* is mounted with, for example, components **3***d* and **3***e*. The components **3***d* and **3***e* are sealed by the second sealing resin **6***b*. In the present embodiment, the components **3***d* and **3***e* are completely covered with the second sealing resin **6***b*, but a part of the components **3***d* and **3***e* may be exposed from the second sealing resin **6***b*. The second surface **1***b* is provided with a columnar electrode **16**. The columnar electrode **16** penetrates the second sealing resin **6***b*. The end surface of

the columnar electrode **16** on the side farther from the substrate **1** is exposed to the outside. Alternatively, the end surface of the columnar electrode **16** on the side farther from the substrate **1** may be covered with a conductive film. The end of the columnar electrode **16** on the side farther from the substrate **1** serves as an external electrode when the module **105** is mounted on the mother substrate or the like. The module **105** has a so-called double-sided mounting structure.

(49) Also in the present embodiment, the same effect as that described in the first embodiment may be obtained. In the present embodiment, since the double-sided mounting structure is employed, more components can be mounted on a limited area of the substrate **1**.

Sixth Embodiment

(50) A module according to a sixth embodiment of the present disclosure will be described with reference to FIGS. **16** and **17**. FIG. **16** is a cross-sectional view illustrating a module **106** according to the present embodiment. FIG. **17** is a cross-sectional view illustrating the module **106** taken along a plane different from that of FIG. **16** by an orientation angle of 90°. The module **106** is basically the same as the module **105** described in the fifth embodiment except the following configuration.

(51) The module **106** includes a thick portion **25***d* having a structure which is mirror-symmetrical to the structure of the thick portion **25** in the vertical direction. In the present embodiment, first extraction electrodes **71***a* and **71***b* are disposed. The thick portion **25** is provided at a location where the first extraction electrode **71***a* is exposed to the side surface of the substrate **1**, and the thick portion **25***d* is provided at a location where the first extraction electrode **71***b* is exposed to the side surface of the substrate **1**.

(52) In other words, when viewed in a cross section taken along a plane perpendicular to the first surface **1***a*, the substrate **1** is provided with the first step portion **54***a* on the first surface **1***a* side and the second step portion **54***b* on the second surface **1***b* side. The first shield film **8***a* covers the first step portion **54***a* and the second step portion **54***b*, and each of the first extraction electrodes **71***a* and **71***b* is connected to the first shield film **8***a*. The positions of the first extraction electrodes **71***a* and **71***b* in the height direction are different from each other. In the present embodiment, the position of the second extraction electrode **72** in the height direction is different from the position of any of the first extraction electrodes **71***a* and **71***b* in the height direction. However, the position of the second extraction electrode **72** in the height direction may be the same as the position of any of the first extraction electrodes **71***a* and **71***b* in the height direction.

(53) Also in the present embodiment, the same effect as that described in the fifth embodiment may be obtained.

Seventh Embodiment

(54) A module according to a seventh embodiment of the present disclosure will be described with reference to FIGS. **18** and **19**. FIG. **18** is a cross-sectional view illustrating a module **107** according to the present embodiment. FIG. **19** is a cross-sectional view illustrating the module **107** taken along a plane different from that of FIG. **18** by an orientation angle of 90°. The module **107** is basically the same as the module **106** described in the sixth embodiment except the following configuration.

(55) The module **107** includes a second shield film **8***b* separate from the first shield film **8***a*.

(56) The substrate **1** has a second surface **1***b* facing opposite to the first surface **1***a*. The module **107** includes a second sealing resin **6***b* disposed to cover the second surface **1***b*, and a second shield film **8***b* that covers a part of the side surface of the substrate **1** and the side surface of the second sealing resin **6***b*.

(57) The configuration of the module **107** can also be expressed as follows. The module **107** includes a substrate **1** having a first surface **1***a* and a second surface **1***b* facing opposite to the first surface **1***a*, a component **3***a* mounted on the first surface **1***a* as a first component, a first sealing resin **6***a* disposed to cover the first surface **1***a* and the first component, a second sealing resin **6***b* disposed to cover the second surface **1***b*, a first shield film **8***a* that covers at least a part of an upper

surface and a side surface of the first sealing resin **6***a* and a side surface of the substrate **1**, and a second shield film **8***b* that covers a part of the side surface of the substrate **1** and a side surface of the second sealing resin **6***b*. When viewed in a cross section taken along a plane perpendicular to the first surface **1***a*, the substrate **1** includes a first step portion **54***a* and a second step portion **54***b* formed closer to the second surface **1***b* than the first step portion **54***a*. The first shield film **8***a* covers the first step portion **54***a*. The second shield film **8***b* covers the second step portion **54***b*. The substrate **1** includes a first extraction electrode **71** disposed to be exposed to the first step portion **54***a* and a second extraction electrode **72** disposed to be exposed to the second step portion **54***b*. The first extraction electrode **71** is connected to the first shield film **8***a*. The second extraction electrode **72** is connected to the second shield film **8***b*. The position of the second extraction electrode **72** in the height direction is different from the position of the first extraction electrode **71** in the height direction.

(58) As illustrated in FIG. **18**, in the module **107**, the depth of the position where the first extraction electrode **71** is disposed when viewed from the first surface **1***a* is different from the depth of the position where the second extraction electrode **72** is disposed when viewed from the second surface **1***b*. In the example illustrated in FIG. **18**, the first extraction electrode **71** is disposed at a position separated from the first surface **1***a* by two insulating layers in the depth direction, whereas the second extraction electrode **72** is disposed at a position separated from the second surface **1***b* by one insulating layer in the depth direction. This is merely an example. For example, the depth of the position where the first extraction electrode **71** is disposed when viewed from the first surface **1***a* may be the same as the depth of the position where the second extraction electrode **72** is disposed when viewed from the second surface **1***b*.

(59) The first shield film **8***a* and the second shield film **8***b* are separated from each other. As illustrated in FIG. **19**, the substrate **1** is provided with a step portion **54***c* and a step portion **54***d*. The substrate **1** includes an extraction electrode **73** and an extraction electrode **74**. The extraction electrode **73** is exposed to the step portion **54***c*. The extraction electrode **74** is exposed to the step portion **54***d*. The step portion **54***c* is provided with a thick portion **25**. The step portion **54***d* is provided with a thick portion **25***d*. The extraction electrode **73** is connected to the thick portion **25** at the step portion **54***c*. The extraction electrode **74** is connected to the thick portion **25***d* at the step portion **54***d*.

(60) Also in the present embodiment, the same effect as that described in the fifth embodiment may be obtained. In the present embodiment, since the first shield film **8***a* and the second shield film **8***b* are physically separated from each other and are electrically independent from each other, it is possible to prevent noise from propagating through the shield film, which makes it possible to improve the shielding performance.

Eighth Embodiment

(61) A module according to an eighth embodiment of the present disclosure will be described with reference to FIGS. **20** and **21**. FIG. **20** is a cross-sectional view illustrating a module **108** according to the present embodiment. FIG. **21** is a cross-sectional view illustrating the module **108** taken along a plane different from that of FIG. **20** by an orientation angle of 90°. The module **108** is basically the same as the module **105** described in the fifth embodiment except the following configuration.

(62) In the present embodiment, the substrate **1** has a plurality of step portions. In other words, the substrate **1** is provided with a first step portion **54***a* and a second step portion **54***b*. Each step portion is provided with a thick portion. In the example illustrated in FIG. **20**, the first step portion **54***a* is provided with a thick portion **25***a*. The second step portion **54***b* is provided with a thick portion **25***b*. In the present embodiment, the first extraction electrodes **71***a* and **71***b* are disposed to be exposed to the side surface of the substrate **1**. The thick portion **25***a* is provided at a location where the first extraction electrode **71***a* is exposed to the side surface of the substrate **1**. The thick portion **25***b* is provided at a location where the first extraction electrode **71***b* is exposed to the side

surface of the substrate **1**.
(63) As illustrated in FIG. **21**, a thick portion **25***c* is provided so as to correspond to the second extraction electrode **72**. It is apparent from the comparison of FIGS. **20** and **21** that in the double-sided mounting structure, the number of thick portions may vary on different sides in a planar view. This is merely an example. The number of thick portions may be the same in each side in a planar view.
(64) Also in the present embodiment, the same effect as that described in the first embodiment may be obtained.
(65) The embodiments described above may be appropriately joined together.
(66) The embodiments disclosed herein are illustrative and non-restrictive in all respects. The scope of the present disclosure is defined by the claims, and encompasses all modifications equivalent in meaning and scope to the claims.
(67) **1**: substrate; **1***a*: first surface; **1***b*: second surface; **3***a*, **3***b*, **3***c*, **3***d*, **3***e*: component; **6***a*: first sealing resin; **6***b*: second sealing resin; **8***a*: first shield film; **8***b*: second shield film; **14**, **15**: pad electrode; **16**: columnar electrode; **20**: trench; **21**: cut; **23**: plating film; **25**, **25***a*, **25***b*, **25***c*, **25***d*: thick portion; **51**: first portion; **52**: second portion; **54**, **54***c*, **54***d*: step portion; **54***a*: first step portion; **54***b*: second step portion; **55**: inclined portion; **71**, **71***a*, **71***b*: first extraction electrode; **72**: second extraction electrode; **73**, **74**: extraction electrode; **81**: first side; **82**: second side; **91**: arrow; **101**, **102**, **103**, **104**, **105**, **106**, **107**, **108**: module

Claims

1. A module comprising: a substrate having a first surface extending in a first direction and a side surface extending in a height direction, said first direction being perpendicular to said height direction; a first component mounted on the first surface; a first sealing resin disposed to cover the first surface and the first component; and a first shield film covering at least a part of an upper surface and a side surface of the first sealing resin and the side surface of the substrate, wherein the side surface of the substrate includes first and second portions, said first portion being positioned closer to the first surface of the substrate than the second portion in the height direction, wherein the first and second portions are parallel to one another, wherein the first and second portions are offset from one another in the first direction, and wherein a connecting surface of the substrate extends from the first portion to the second portion in the first direction and is oriented perpendicular to the first and second portions such that when viewed in a cross section taken along a plane perpendicular to the first surface, the substrate is provided with a step portion, the substrate includes a first extraction electrode disposed to be exposed to the step portion, the first extraction electrode is connected to the first shield film, the first shield film includes one or more thick portions having a film thickness greater than a film thickness of other portions in the step portion, the substrate has a first side and a second side, the first extraction electrode is disposed to be exposed to the step portion at the first side, the substrate further includes a second extraction electrode disposed to be exposed to the step portion at the second side, a position of the second extraction electrode in the height direction is different from a position of the first extraction electrode in the height direction, and the first extraction electrode, the second extraction electrode and the first shield film are connected to a ground potential, and when viewed in a cross section taken along a plane perpendicular to the first surface, a side surface of a portion where the first sealing resin and the substrate are joined together includes an inclined portion where the side surface of the substrate is inclined between the first portion and the first surface.
2. The module according to claim 1, wherein the substrate has a second surface facing opposite to the first surface, the module further includes a second sealing resin disposed to cover the second surface and the first shield film extends to cover a side surface of the second sealing resin.
3. The module according to claim 1, wherein the substrate has a second surface facing opposite to

the first surface, the module further includes a second sealing resin disposed to cover the second surface, and a second shield film disposed to cover a part of the side surface of the substrate and a side surface of the second sealing resin.

4. The module according to claim 3, wherein the first shield film and the second shield film are separated from each other.

5. The module according to claim 1, wherein the substrate has a second surface facing opposite to the first surface, the module further includes a second sealing resin disposed to cover the second surface and the first shield film extends to cover a side surface of the second sealing resin.

6. The module according to claim 1, wherein the substrate has a second surface facing opposite to the first surface, the module further includes a second sealing resin disposed to cover the second surface, and a second shield film disposed to cover a part of the side surface of the substrate and a side surface of the second sealing resin.

7. The module according to claim 1, wherein the first shield film has a side surface including first and second sections that cover the first and second portions of the side surface of the substrate, respectively, wherein the first and second sections are parallel to one another, and wherein the first and second sections are offset from one another in the first direction.

8. The module according to claim 7, wherein the first section is laterally offset from the second portion in the first direction, and wherein the first section does not extend outwards beyond the second portion in the first direction.

9. The module according to claim 7, wherein an intermediate surface of the first shield film extends from the first section to the second section in the first direction.

10. The module according to claim 9, wherein the intermediate surface is oriented perpendicular to the first and second sections.