US 20250267802A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0267802 A1**

Chi (43) **Pub. Date: Aug. 21, 2025**

(54) **ELECTRONIC COMPONENT**

(71) Applicant: **COMPAL ELECTRONICS, INC.**, Taipei City (TW)

(72) Inventor: **Chia-Ming Chi**, Taipei City (TW)

(73) Assignee: **COMPAL ELECTRONICS, INC.**, Taipei City (TW)

(21) Appl. No.: **19/047,574**

(22) Filed: **Feb. 6, 2025**

(30) **Foreign Application Priority Data**

Feb. 16, 2024 (TW) 113105440

Publication Classification

(51) **Int. Cl.**

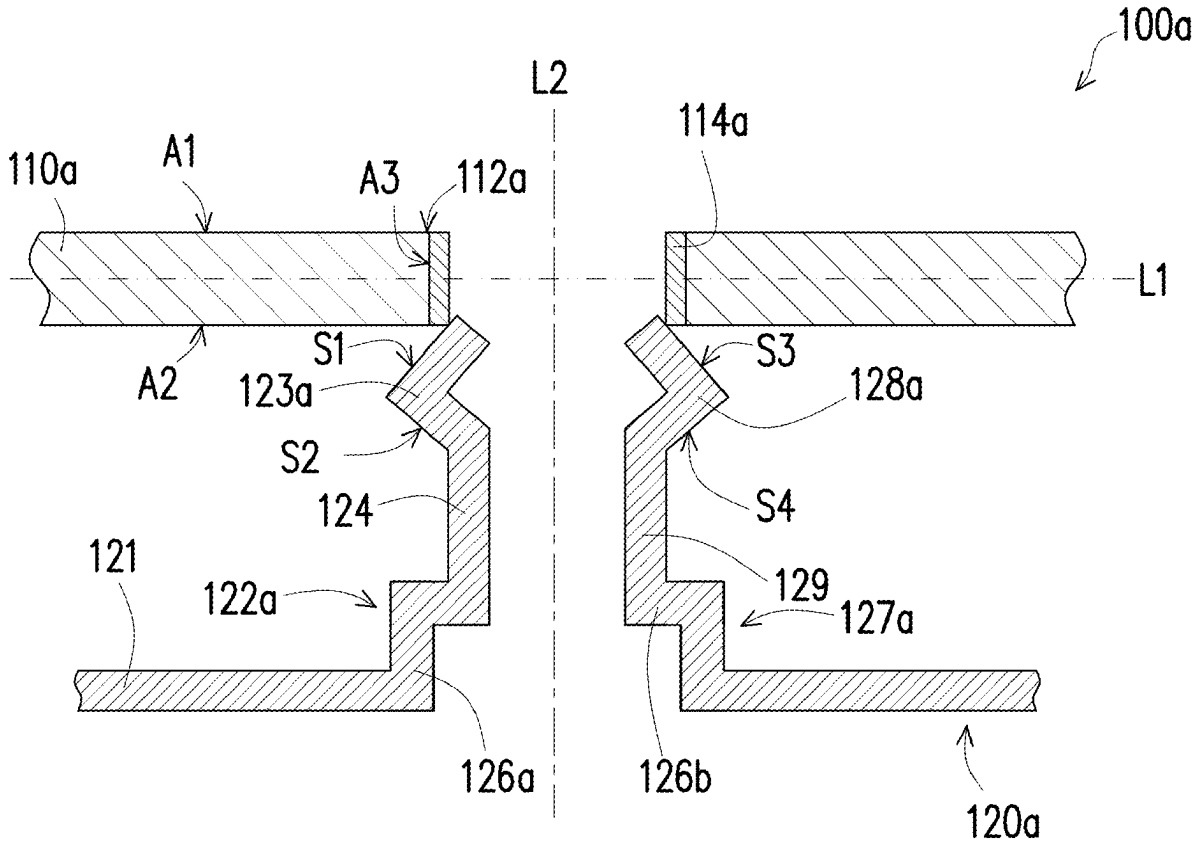
H05K 5/00	(2025.01)
H05K 5/02	(2006.01)
H05K 5/04	(2006.01)

(52) **U.S. Cl.**

CPC ***H05K 5/0069*** (2013.01); ***H05K 5/0217*** (2013.01); ***H05K 5/0247*** (2013.01); ***H05K 5/04*** (2013.01)

(57) **ABSTRACT**

An electronic component includes a circuit board and a metal casing. The circuit board includes at least one opening and at least one pad. The circuit board is detachably connected to the metal casing. The metal casing includes a plate, a first connecting member and a second connecting member. The plate is connected to the first connecting member and the second connecting member. The first connecting member and the second connecting member partially pass through the at least one opening and are connected to the circuit board. The first connecting member and the second connecting member contact the at least one pad, so that the circuit board is electrically connected to the plate.



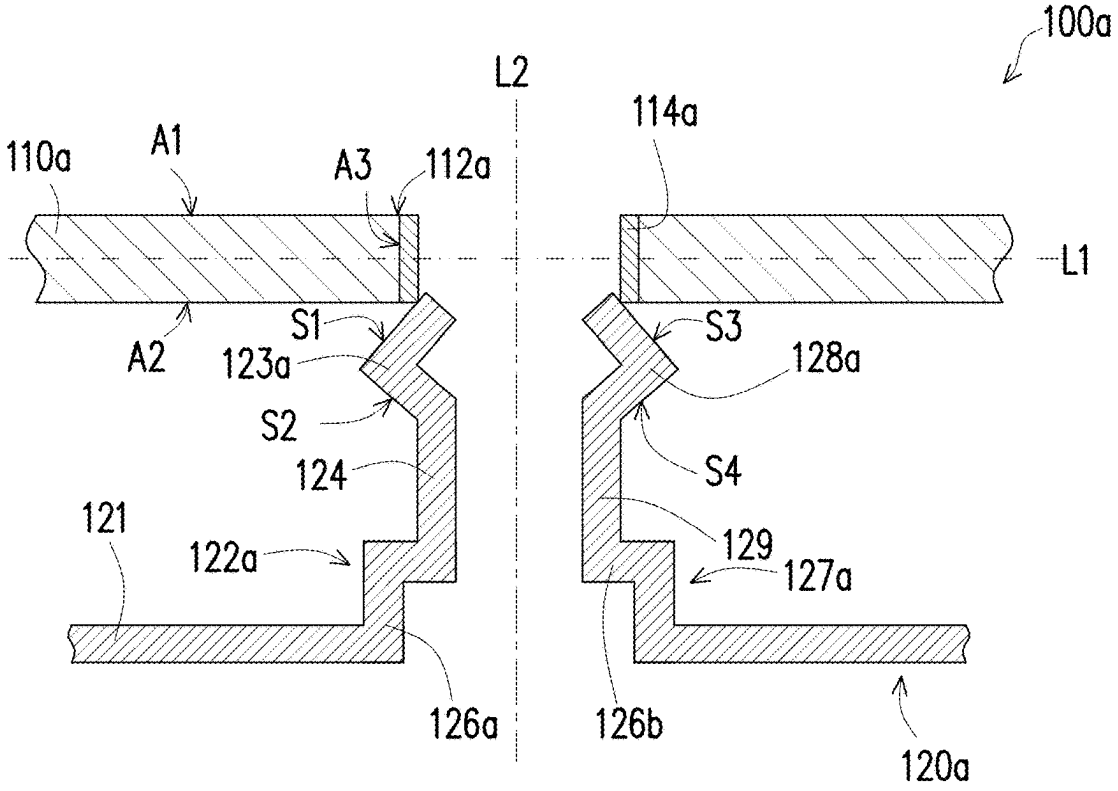

100a
L2
114a
110a
A1
A3
112a
L1
S1
S3
A2
123a
128a
S2
S4
124
121
129
122a
127a
126a
126b
120a

FIG. 1

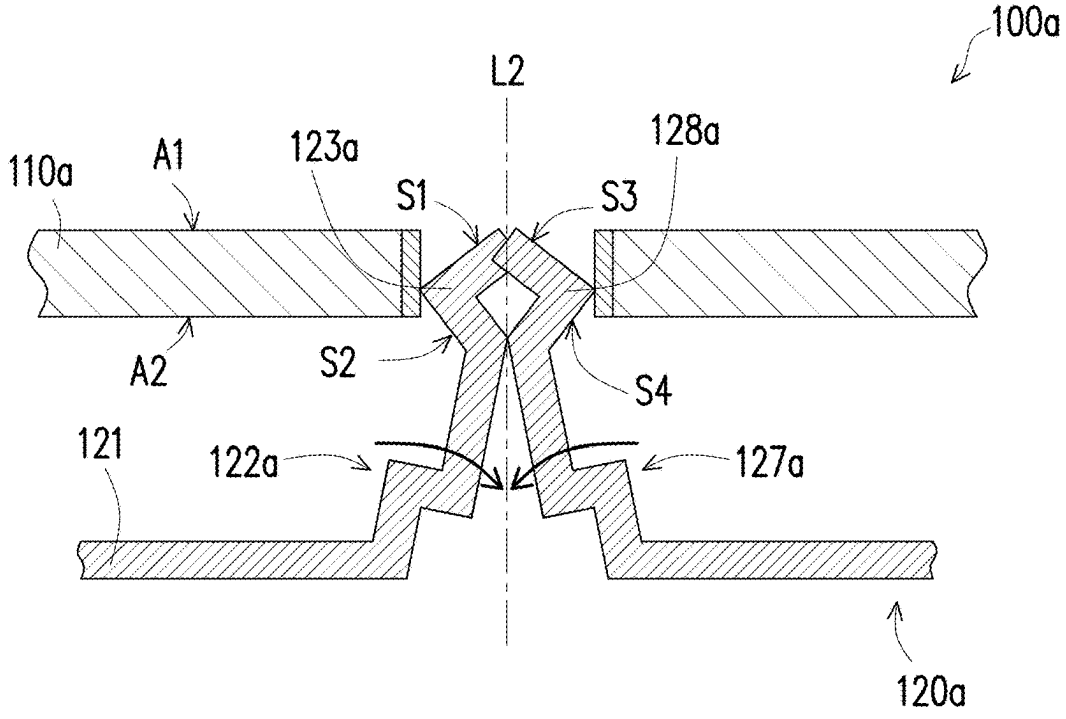

100a
L2
128a
110a
A1
123a
S1
S3
A2
S2
S4
121
122a
127a
120a

FIG. 2

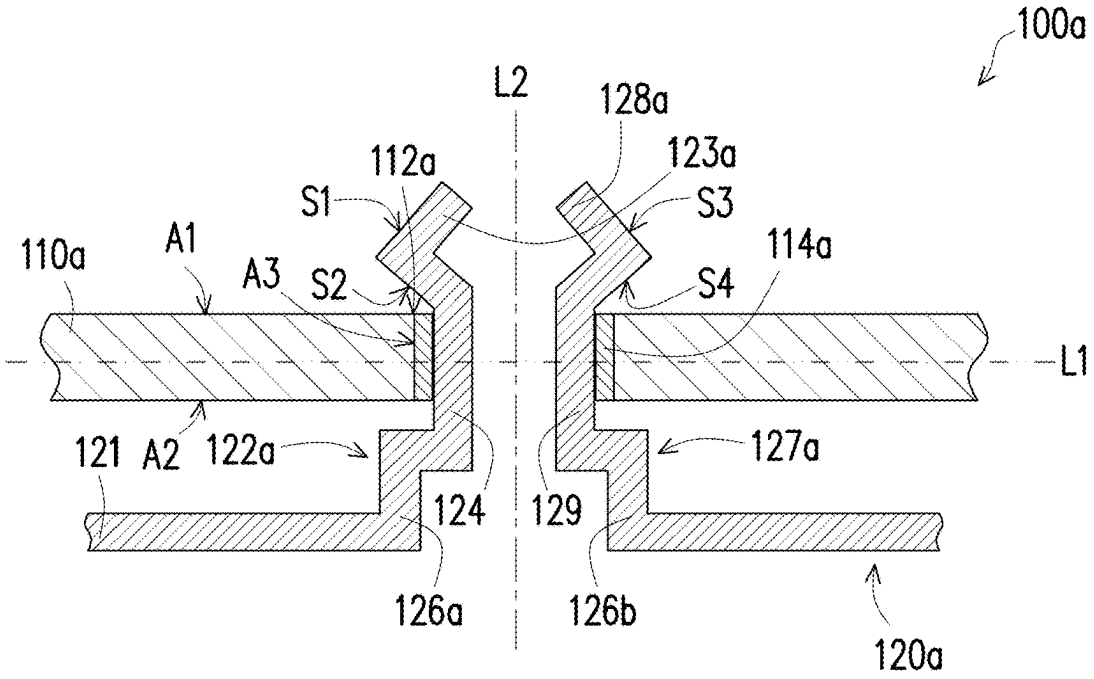

100a
L2
128a
123a
112a
S1
S3
110a
A1
A3
S2
S4
114a
L1
121
A2
122a
127a
124
129
126a
126b
120a

FIG. 3

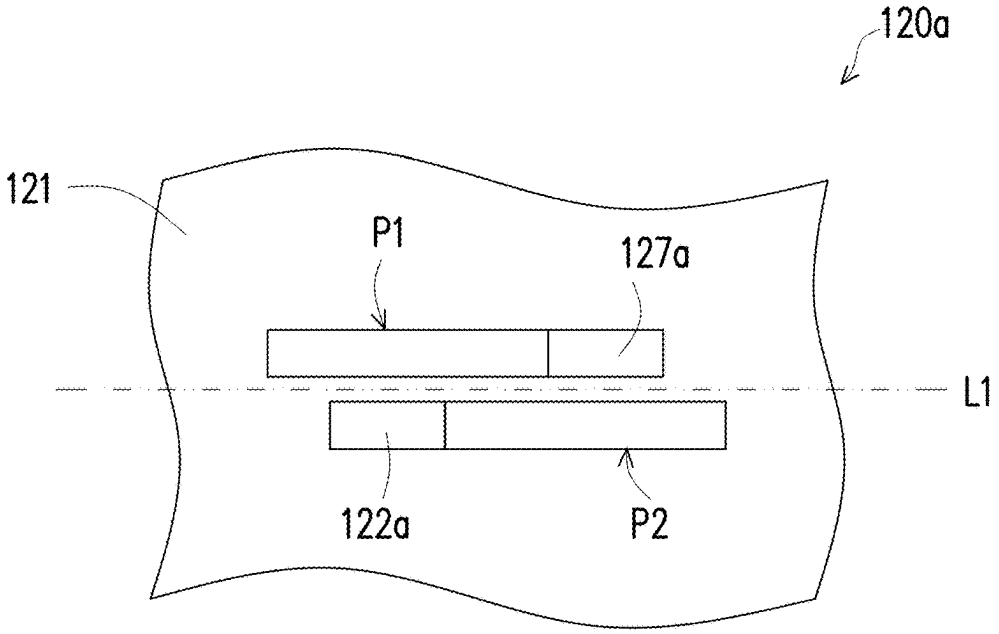

120a
121
P1
127a
L1
122a
P2

FIG. 4

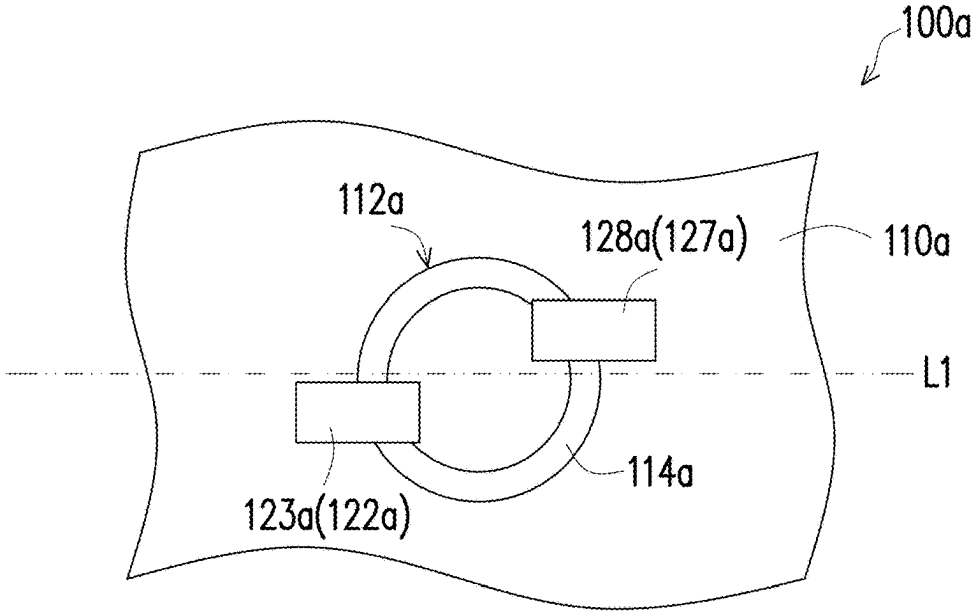

100a
112a
128a(127a)
110a
L1
114a
123a(122a)

FIG. 5

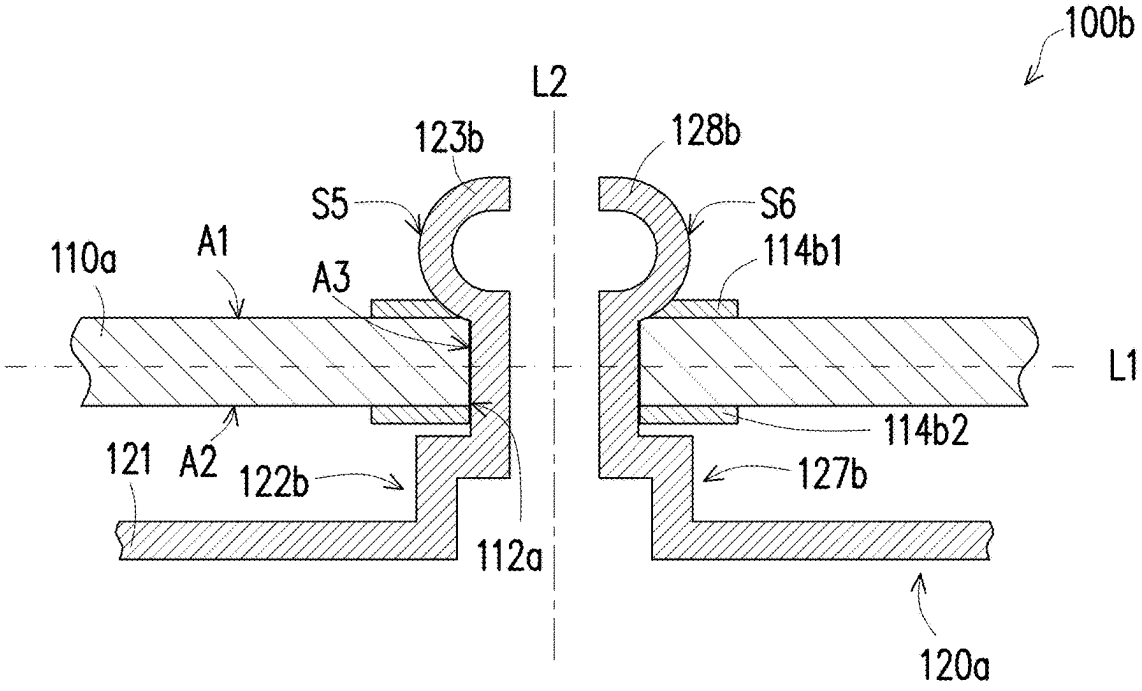

100b
L2
123b
128b
S5
S6
110a
A1
A3
114b1
L1
121
A2
122b
114b2
127b
112a
120a

FIG. 6A

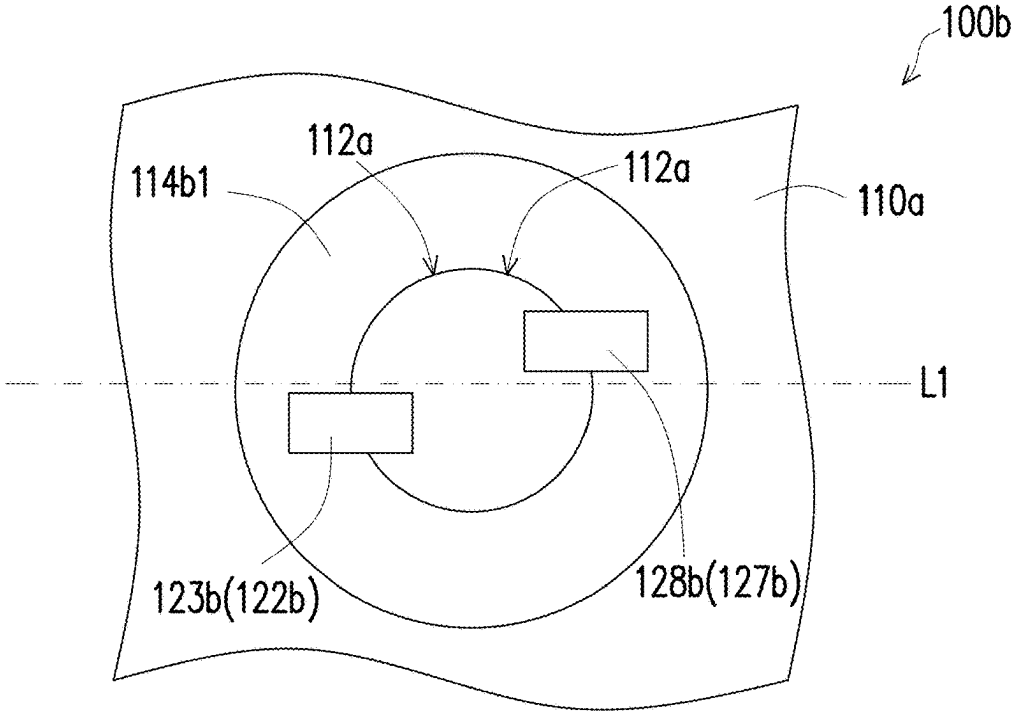

100b
112a
114b1
112a
110a
L1
123b(122b)
128b(127b)

FIG. 6B

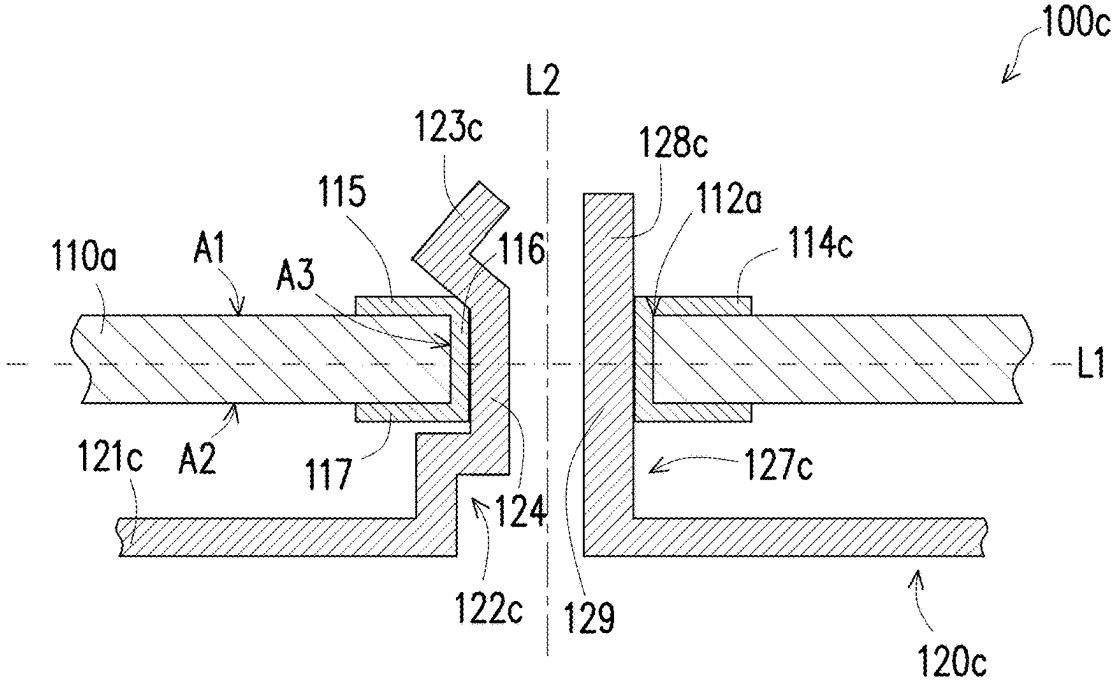

100c
L2
123c
128c
115
112a
110a
A1
A3
116
114c
L1
121c
A2
117
127c
124
122c
129
120c

FIG. 7

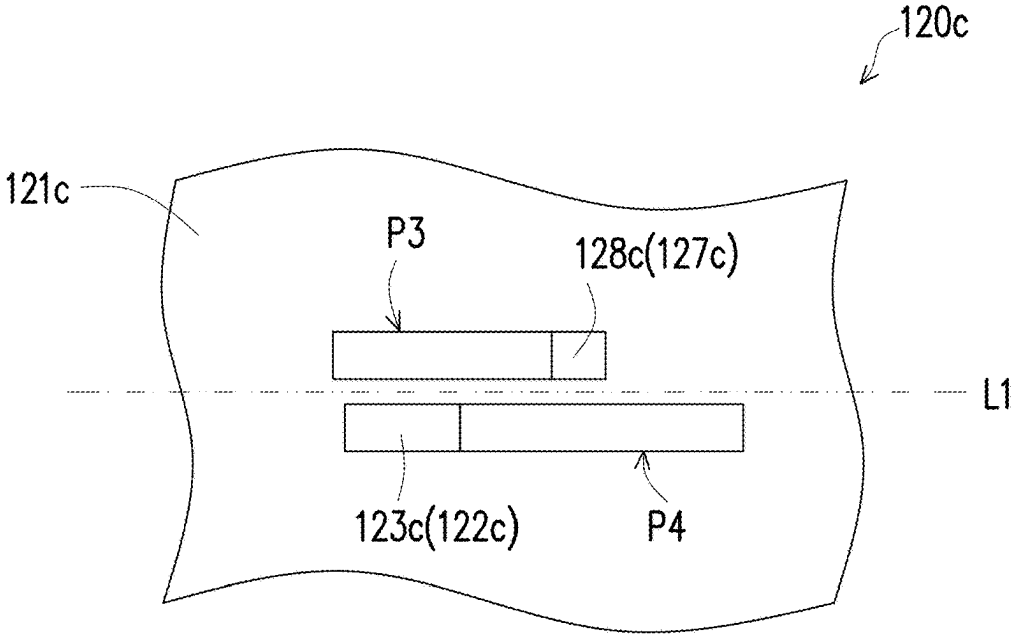

120c
121c
P3
128c(127c)
L1
123c(122c)
P4

FIG. 8

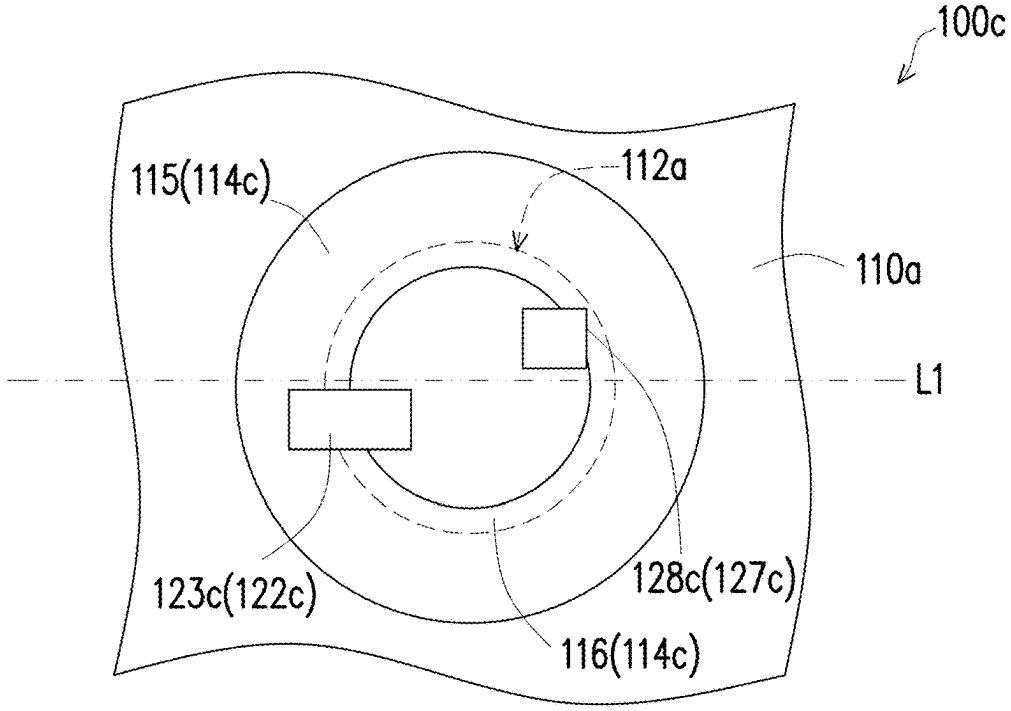

100c
115(114c)
112a
110a
L1
123c(122c)
128c(127c)
116(114c)

FIG. 9

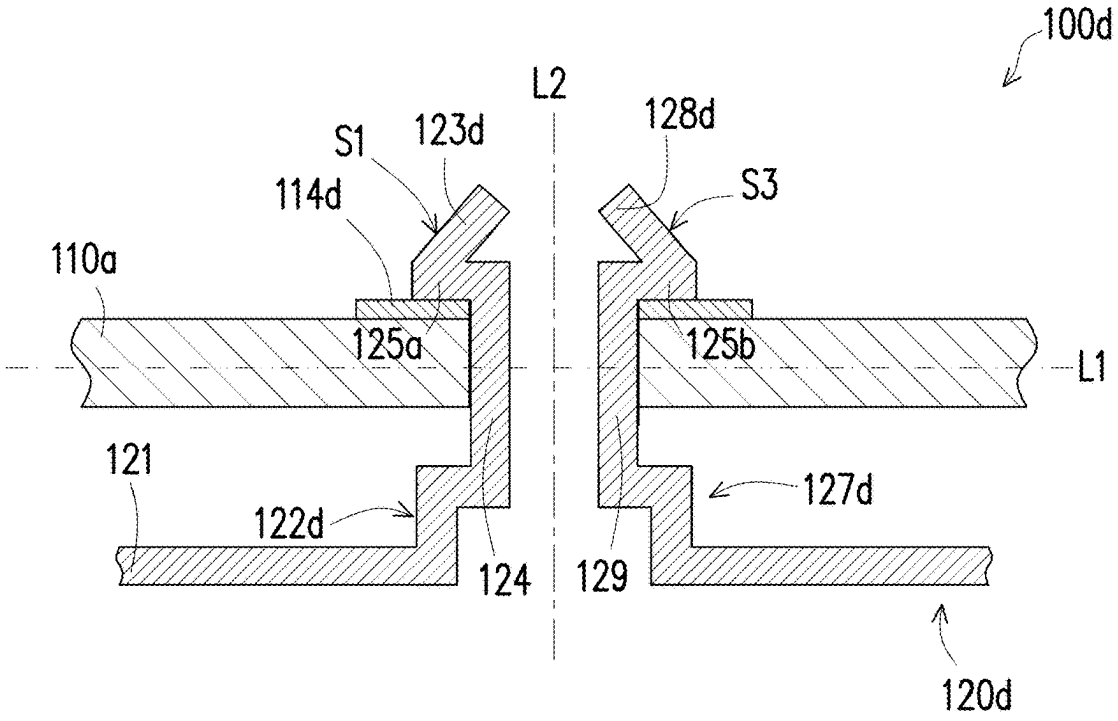

100d
L2
S1
123d
128d
S3
114d
110a
125a
125b
L1
121
122d
127d
124
129
120d

FIG. 10

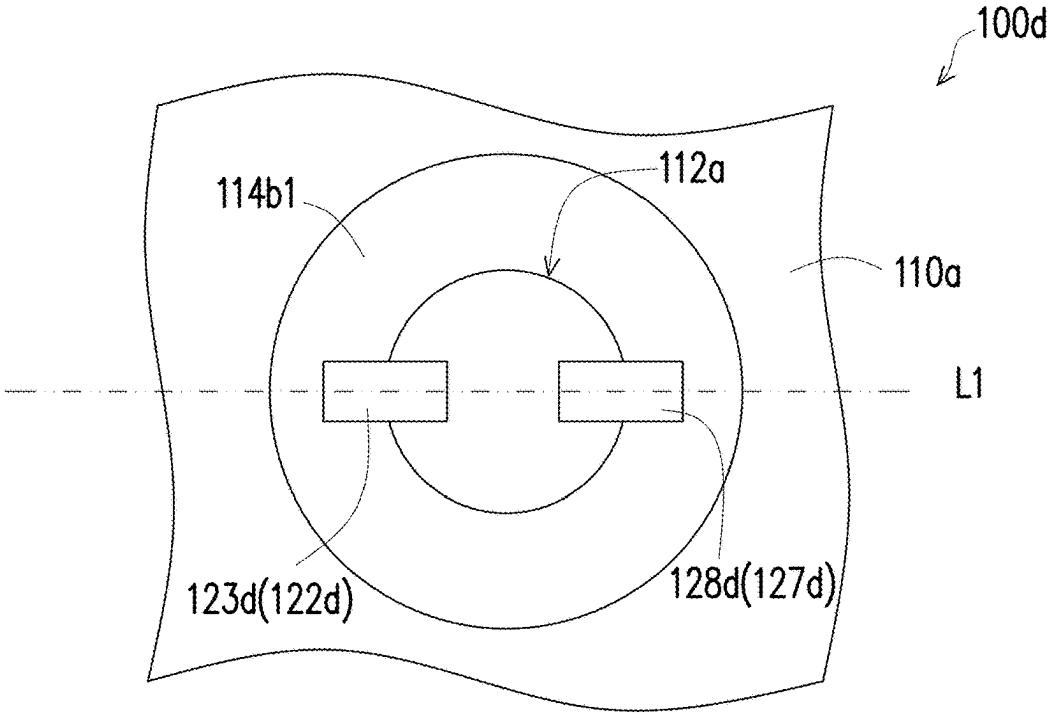

100d
114b1
112a
110a
L1
123d(122d)
128d(127d)

FIG. 11

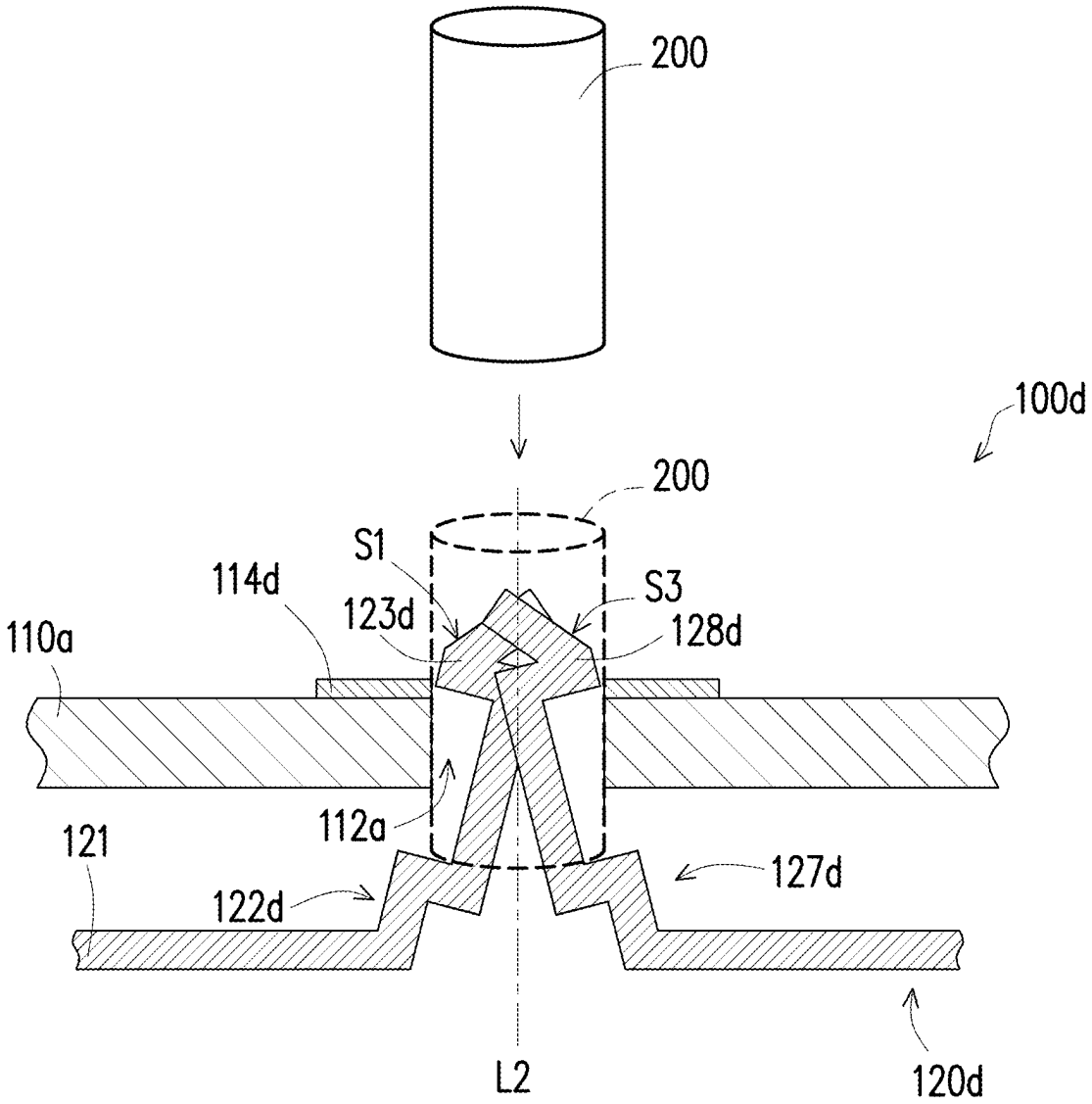

200
100d
200
S1
S3
114d
123d
128d
110a
112a
121
127d
122d
L2
120d

FIG. 12

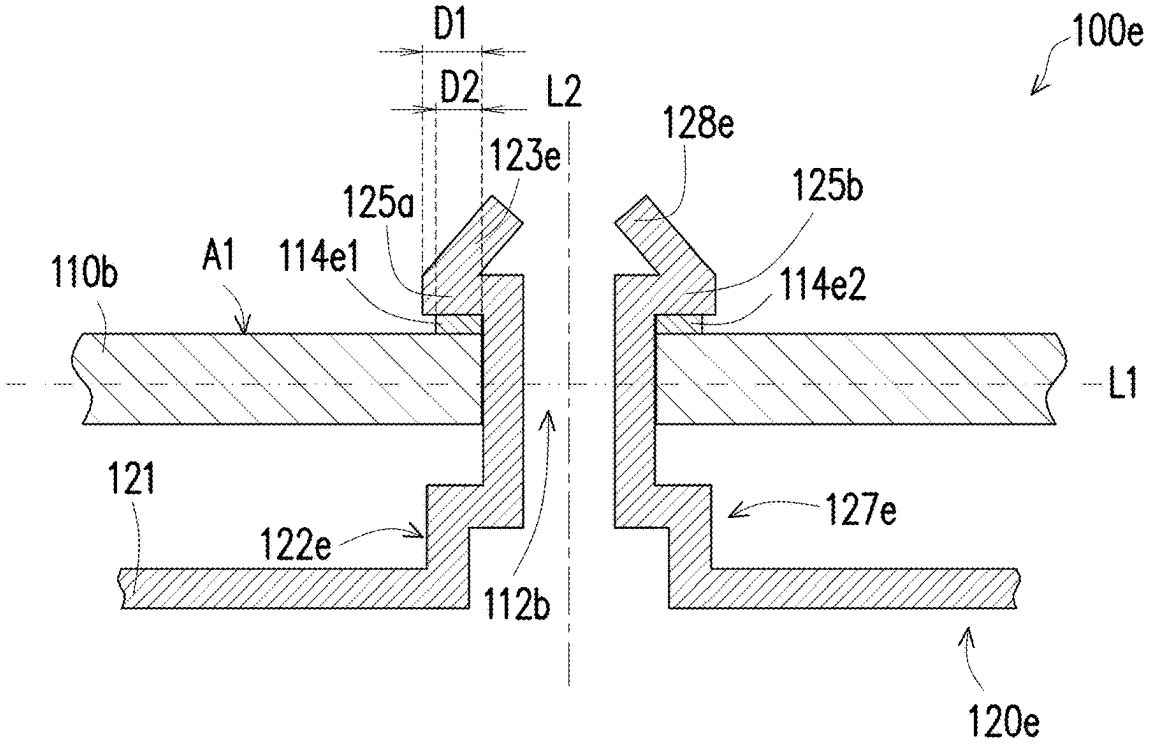

D1
D2
L2
100e
128e
123e
125b
125a
110b
A1
114e1
114e2
L1
121
127e
122e
112b
120e

FIG. 13

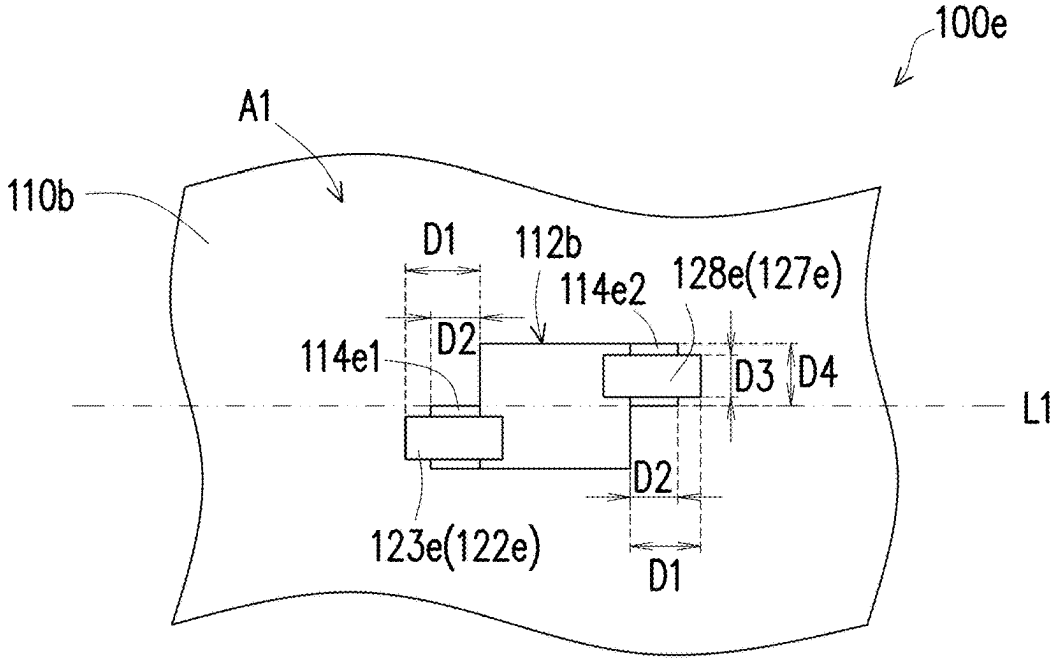

100e
A1
110b
D1
112b
114e2
128e(127e)
D2
114e1
D3
D4
L1
D2
123e(122e)
D1

FIG. 14

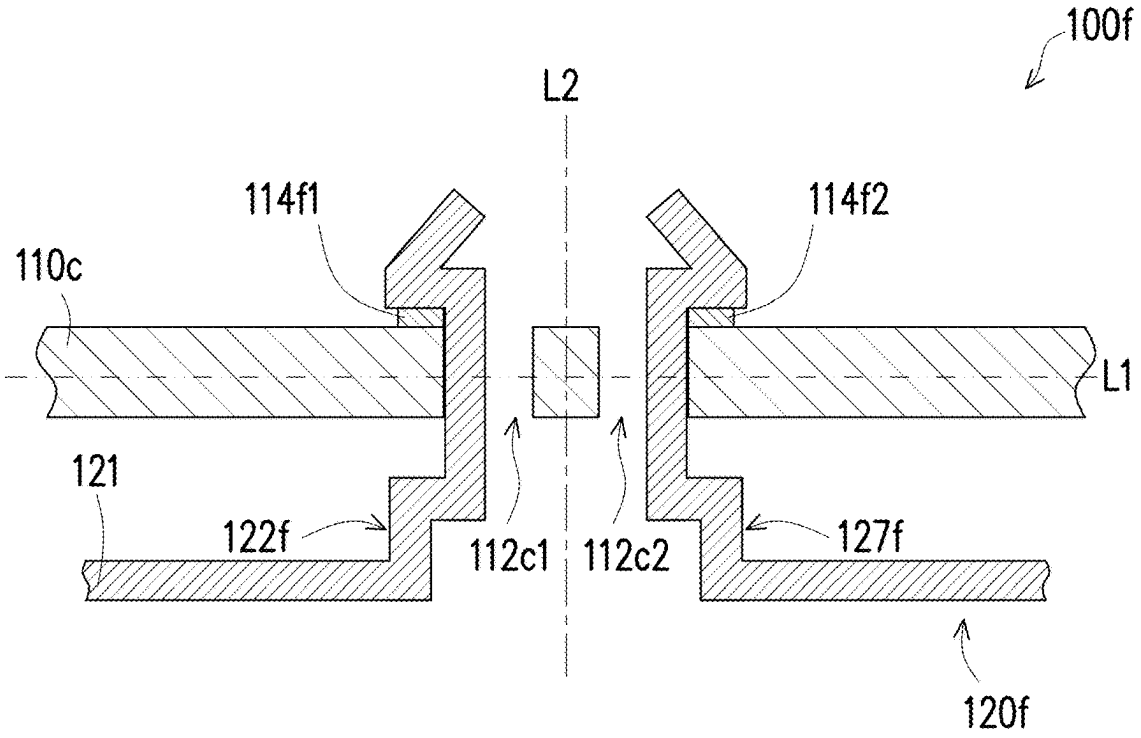

100f
L2
114f1
114f2
110c
L1
121
122f
112c1
112c2
127f
120f

FIG. 15

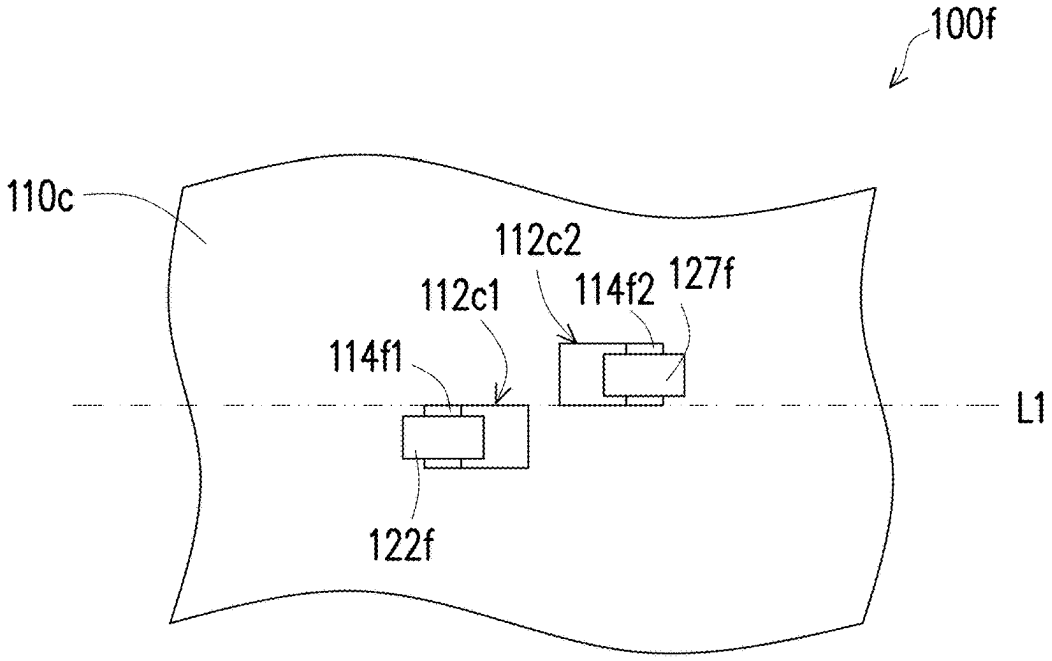

100f
110c
112c2
112c1
114f2
127f
114f1
L1
122f

FIG. 16

ELECTRONIC COMPONENT

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Taiwan application serial no. 113105440, filed on Feb. 16, 2024. The entirety of the above-mentioned patent application is hereby incorporated by reference herein and made a part of this specification.

TECHNICAL FIELD

[0002] This disclosure relates to a component, and in particular to an electronic component.

DESCRIPTION OF RELATED ART

[0003] The circuit board and casing of present-day devices are fastened together through screws. During disassembly or assembly, screws and additional tools (such as screwdrivers) are required to fasten with manual labor, thus becoming inconvenient to use.

SUMMARY

[0004] This disclosure provides an electronic component that is easy to disassemble and assemble.

[0005] The electronic component of this disclosure includes a circuit board and a metal casing. The circuit board includes at least one opening and at least one pad. The circuit board is detachably connected to the metal casing. The metal casing includes a plate, a first connecting member, and a second connecting member. The plate is connected to the first connecting member and the second connecting member. The first connecting member and the second connecting member partially pass through at least one opening and are connected to the circuit board. The first connecting member and the second connecting member are in contact with at least one pad so that the circuit board is electrically connected to the plate.

[0006] Based on the above, the metal casing of the electronic component is detachably connected to the circuit board through the first connecting member and the second connecting member. The first connecting member and the second connecting member are in contact with the pad of the circuit board so that the circuit board is electrically connected to the plate. The circuit board is easy to assemble onto the metal casing or disassemble off the metal casing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** and FIG. **2** illustrate the assembly process of an electronic component according to an embodiment of this disclosure.

[0008] FIG. **3** is a schematic cross-sectional view of the electronic component of FIG. **1** after assembly.

[0009] FIG. **4** is a top view of the metal casing of FIG. **1**.

[0010] FIG. **5** is a top view of the electronic component of FIG. **3**.

[0011] FIG. **6**A is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure.

[0012] FIG. **6**B is a top view of the electronic component of FIG. **6**A.

[0013] FIG. **7** is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure.

[0014] FIG. **8** is a top view of the metal casing of FIG. **7**.

[0015] FIG. **9** is a top view of the electronic component of FIG. **7**.

[0016] FIG. **10** is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure.

[0017] FIG. **11** is a top view of the electronic component of FIG. **10**.

[0018] FIG. **12** is a schematic diagram of the disassembly process of the electronic component of FIG. **10**.

[0019] FIG. **13** is a schematic cross-sectional view of an electronic component of another embodiment of this disclosure.

[0020] FIG. **14** is a top view of an electronic component according to another embodiment of this disclosure.

[0021] FIG. **15** is a schematic cross-sectional view of an electronic component of another embodiment of this disclosure.

[0022] FIG. **16** is a top view of the electronic component of FIG. **15**.

DETAILED DESCRIPTION OF DISCLOSED EMBODIMENTS

[0023] FIG. **1** and FIG. **2** illustrate the assembly process of an electronic component according to an embodiment of this disclosure. FIG. **3** is a schematic cross-sectional view of the electronic component of FIG. **1** after assembly. FIG. **4** is a top view of the metal casing of FIG. **1**. FIG. **5** is a top view of the electronic component of FIG. **3**. Please refer to FIG. **1** to FIG. **5** simultaneously. The electronic component **100***a* includes a circuit board **110***a* and a metal casing **120***a*. The circuit board **110***a* is detachably connected to the metal casing **120***a*. The circuit board **110***a* includes at least one opening **112***a* and at least one pad **114***a*. The metal casing **120***a* includes a plate **121**, a first connecting member **122***a*, and a second connecting member **127***a*. The plate **121** is connected to the first connecting member **122***a* and the second connecting member **127***a*.

[0024] As shown in FIG. **3**, the first connecting member **122***a* and the second connecting member **127***a* partially pass through the opening **112***a* and are detachably connected to the circuit board **110***a*. The first connecting member **122***a* and the second connecting member **127***a* have a certain flexibility and may move (e.g., bend) relatively to the plate **121** to lock or unlock from the circuit board **110***a*. The first connecting member **122***a* and the second connecting member **127***a* contact the pad **114***a* of the circuit board **110***a* so that the circuit board **110***a* is electrically connected to the plate **121**.

[0025] As shown in FIG. **3** and FIG. **4**, the first connecting member **122***a* and the second connecting member **127***a* of this embodiment are formed through stamping, for example. Two corresponding holes P**1** and P**2** are formed on the plate **121**. The plate **121**, the first connecting member **122***a*, and the second connecting member **127***a* are integrated as a whole but are not limited thereto. The first connecting member **122***a* and the second connecting member **127***a* may replace screws so that the circuit board **110***a* and the metal casing **120***a* may be disassembled and assembled without tools and screws, thereby simplifying the components of the electronic component **100***a*, reaching the effect of improving

manufacturing efficiency, reducing manufacturing time, improving recycling efficiency, miniaturizing the fixed structure (the first connecting member **122***a* and the second connecting member **127***a*), and reducing the wiring layout restrictions and the component setup restrictions of the circuit board **110***a*.

[0026] As shown in FIG. **1**, the first connecting member **122***a* includes a first convex part **123***a* and a first connecting part **124** connected to each other, and the first connecting part **124** is connected to the plate **121**. The first convex part **123***a* includes a first inclined surface S**1**, and the first inclined surface S**1** faces away from the circuit board **110***a*. The first convex part **123***a* (first connecting member **122***a*) optionally includes a second inclined surface S**2**. The second inclined surface S**2** faces the circuit board **110***a*, and is connected to the first inclined surface S**1**. The first inclined surface S**1** and the second inclined surface S**2** are inclined to a first axis L**1** and a second axis L**2**, so the cross-sectional shape of the first convex part **123***a* is V-shaped. The first connecting part **124** extends along the second axis L**2**. The first axis L**1** is parallel to the plate **121**, and the second axis L**2** is perpendicular to the first axis L**1** and the circuit board **110***a*.

[0027] The second connecting member **127***a* includes a connected second convex part **128***a* and a second connecting part **129**, and the second connecting part **129** is connected to the plate **121**. The second convex part **128***a* includes a third inclined surface S**3**, and the third inclined surface S**3** faces away from the circuit board **110***a*. The second convex part **128***a* (second connecting member **127***a*) optionally includes a fourth inclined surface S**4**. The fourth inclined surface S**4** faces the circuit board **110***a*, and is connected to the third inclined surface S**3**. The third inclined surface S**3** and the fourth inclined surface S**4** are inclined to the first axis L**1** and the second axis L**2**, so the cross-sectional shape of the second convex part **128***a* is V-shaped. The second connecting part **129** extends along the second axis L**2**. The first connecting member **122***a* and the second connecting member **127***a* of this embodiment have the same structure but are not limited thereto.

[0028] As shown in FIG. **4**, the first connecting member **122***a* and the second connecting member **127***a* are staggered on the first axis L**1** but are not limited thereto. As shown in FIG. **5**, the number of the opening **112***a* of the circuit board **110***a* of this embodiment is one, the number of pad **114***a* is one, and the pad **114***a* is connected to an inner wall A**3** of the corresponding opening **112***a*, but it is not limited thereto.

[0029] FIG. **1** to FIG. **3** illustrate the disassembly and assembly process of the circuit board and metal casing. As shown in FIG. **1**, during the process of assembling the circuit board **110***a* and the metal casing **120***a*, the circuit board **110***a* may move along the second axis L**2** close to the metal casing **120***a*. The opening **112***a* of the circuit board **110***a* corresponds to the first connecting member **122***a* and the second connecting member **127***a*. A bottom surface A**2** (pad **114***a*) of circuit board **110***a* contacts the first inclined surface S**1** (first convex part **123***a*) and the third inclined surface S**3** (second convex part **128***a*). The bottom surface A**2** faces the plate **121**.

[0030] As shown in FIG. **2**, the circuit board **110***a* continues to move closer to the plate **121**, and the first inclined surface S**1** (the first convex part **123***a*) and the third inclined surface S**3** (the second convex part **128***a*) are pushed by the bottom surface A**2** of the circuit board **110***a*, and the first connecting member **122***a* is moved closer to the second connecting member **127***a*, and the second connecting member **127***a* is moved closer to the first connecting member **122***a*. The first connecting member **122***a* and the second connecting member **127***a* enter the opening **112***a*, and the circuit board **110***a* may continue to move toward the plate **121**. As shown in FIG. **3**, the circuit board **110***a* moves into position. The first convex part **123***a* and the second convex part **128***a* pass through the opening **112***a* and are exposed on the circuit board **110***a* from the opening **112***a*. The first connecting part **124** and the second connecting part **129** are at least partially located inside the opening **112***a*. The first connecting member **122***a* and the second connecting member **127***a* rely on their own flexibility to return to their positions in FIG. **3** from the positions in FIG. **2**. At this point, the circuit board **110***a* and metal casing **120***a* are assembled.

[0031] As shown in FIG. **5**, the projection part of at least one of the assembled first connecting member **122***a* and the second connecting member **127***a* on the circuit board **110***a* is located in the opening **112***a* so that at least one of the first connecting member **122***a* and the second connecting member **127***a* is engaged with the circuit board **110***a*. In this embodiment, the projection part of the first connecting member **122***a* and the second connecting member **127***a* to the circuit board **110***a* is located at the opening **112***a*, and the first connecting member **122***a* and the second connecting member **127***a* are engaged with the circuit board **110***a*. The first connecting part **124** of the first connecting member **122***a* and the second connecting part **129** of the second connecting member **127***a* are in contact with the pad **114***a* so that the circuit board **110***a* is coupled to the plate **121** and grounded to maintain the grounding of the circuit board **110***a* and noise shielding function of the metal casing **120***a*.

[0032] Since the pad **114***a* is set up on the inner wall A**3** of the opening **112***a*, a top surface A**1** and a bottom surface A**2** of the circuit board **110***a* may be used entirely for laying circuits and electronic components (not shown), thereby increasing the wiring and component installation space on the top surface A**1** and the bottom surface A**2** of the circuit board **110***a*. The top surface A**1** faces away from the plate **121** and is opposite to the bottom surface A**2**.

[0033] As shown in FIG. **3**, the first connecting member **122***a* further includes a positioning part **126***a*, and the second connecting member **127***a* further includes a positioning part **126***b*. The positioning part **126***a* is connected between the first connecting part **124** and the plate **121** in a bending manner, and the positioning part **126***b* is connected between the second connecting part **129** and the plate **121** in a bending manner. The positioning parts **126***a* and **126***b* are adapted to block the circuit board **110***a* from moving along the second axis L**2** to ensure that a certain distance is maintained between the circuit board **110***a* and the plate **121**.

[0034] When the circuit board **110***a* is to be disassembled from the metal casing **120***a*, the circuit board **110***a* may be forced to move from the position of FIG. **3** to the position of FIG. **2**. During the movement of circuit board **110***a*, the circuit board **110***a* moves away from the plate **121** along the second axis L**2**. The top surface A**1** (pad **114***a*) of the circuit board **110***a* pushes against the second inclined surface S**2** (first convex part **123***a*) and the fourth inclined surface S**4** (second convex part **128***a*) so that the first connecting member **122***a* and the second connecting member **127***a* move to the position of FIG. **2**, the first convex part **123***a* of

the first connecting member **122***a* and the second convex part **128***a* of the second connecting member **127***a* enter the opening **112***a*, and the first connecting member **122***a* and the second connecting member **127***a* disengage from the circuit board **110***a*.

[0035] Then, the circuit board **110***a* may further move away from the metal casing **120***a* from the position of FIG. **2** to the position of FIG. **1**. After the circuit board **110***a* is separated from the metal casing **120***a* (see FIG. **1**), the first connecting member **122***a* and the second connecting member **127***a* return to their positions in FIG. **1** by their own flexibility. At this point, the disassembly of the circuit board **110***a* and the metal casing **120***a* is completed. The circuit board **110***a* and the metal casing **120***a* may be disassembled and assembled without tools.

[0036] In addition, as shown in FIG. **5**, the shape of the opening **112***a* is, for example, a circle, and the opening **112***a* may be an opening used for setting screws in a conventional circuit board. Thereby, the metal casing **120***a* is applicable to the conventional circuit board, thus improving the convenience of use of the electronic component **100***a* (metal casing **120***a*). The number, structure, and setup arrangements of the opening **112***a*, the pad **114***a*, the first connecting member **122***a*, and the second connecting member **127***a* are not limited to this embodiment.

[0037] FIG. **6**A is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure. FIG. **6**B is a top view of the electronic component of FIG. **6**A. Please refer to FIG. **3**, FIG. **6**A and FIG. **6**B simultaneously. The electronic component **100***b* of this embodiment is similar to the embodiment mentioned above. The difference between the two is that the first convex part **123***b* of the first connecting member **122***b* of this embodiment includes a curved surface S**5**, and the second convex part **128***b* of the second connecting member **127***b* includes another arc surface S**6**. The first convex part **123***b* and the second convex part **128***b* have a C-shaped cross-sectional shape. The number of the pads **114***b***1** and **114***b***2** is two, and the two pads **114***b***1** and **114***b***2** surround the opening **112***a*.

[0038] The pad **114***b***1** is located on the top surface A**1** of the circuit board **110***a*, and the pad **114***b***2** is located on the bottom surface A**2** of the circuit board **110***a*. The first convex part **123***b* and the second convex part **128***b* are in contact with the pad **114***b***1**, so the circuit board **110***a* is coupled to the plate **121** and grounded. The metal casing **120***b* may be disassembled and assembled without tools through the two curved surfaces S**5** and S**6** and the circuit board **110***a*. The electronic component **100***b* of this embodiment has the same effect as the embodiment mentioned above and will not be described again.

[0039] FIG. **7** is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure. FIG. **8** is a top view of the metal casing of FIG. **7**. FIG. **9** is a top view of the electronic component of FIG. **7**. Please refer to FIG. **3**, FIG. **7** to FIG. **9** simultaneously. The electronic component **100***c* of this embodiment is similar to the embodiment mentioned above. The difference between the two is that the structure of the first connecting member **122***c* of this embodiment differs from the structure of the second connecting member **127***c*. The cross-sectional shape of the first convex part **123***c* of the first connecting member **122***c* is V-shaped. The second convex part **128***c* of the second connecting member **127***c* and the second connecting part **129** extend along the second axis L**2**, and the cross-sectional shape of the second convex part **128***c* is a rectangle. The size of the hole P**4**, which corresponds to the first connecting member **122***c* in the plate **121***c* of the metal casing **120***c*, is larger than the size of the hole P**3**, which corresponds to the second connecting member **127***c*.

[0040] As shown in FIG. **7**, the pad **114***c* includes a first part **115** and a second part **116** that are connected. The first part **115** is located on the top surface A**1** of the circuit board **110***a*, and the second part **116** is connected to the inner wall surface A**3** of the opening **112***a*. The pad **114***c* optionally includes a third part **117**. The third part **117** is located on the bottom surface A**2** of the circuit board **110***a* and is connected to the second part **116**. The first convex part **123***c* of the first connecting member **122***c* contacts the first part **115** of the pad **114***c*, the first connecting part **124** of the first connecting member **122***c*, and the second connecting part **129** of the second connecting member **127***c* contacts the second part **116** of the pad **114***c*. As shown in FIG. **9**, the projection part of the first connecting member **122***c* to the circuit board **110***a* is located at the opening **112***a*. The electronic component **100***c* of this embodiment has the same effect as the embodiment mentioned above and will not be described again.

[0041] FIG. **10** is a schematic cross-sectional view of an electronic component according to another embodiment of this disclosure. FIG. **11** is a top view of the electronic component of FIG. **10**. FIG. **12** is a schematic diagram of the disassembly process of the electronic component of FIG. **10**. Please refer to FIG. **3**, FIG. **10** to FIG. **12** simultaneously. The electronic component **100***d* of this embodiment is similar to the embodiment mentioned above. The difference between the two is that the first convex part **123***d* of the first connecting member **122***d* of this embodiment includes a horizontal part **125***a*, and the second convex part **128***d* of the second connecting member **127***d* includes another horizontal part **125***b*. The horizontal parts **125***a* and **125***b* are parallel to the first axis L**1**.

[0042] As shown in FIG. **10** and FIG. **11**, the horizontal part **125***a* is connected to the first inclined surface S**1** and the first connecting part **124**, and is located between the first inclined surface S**1** and the first connecting part **124**. The horizontal part **125***b* is connected to the third inclined surface S**3** and the second connecting part **129**, and is located between the third inclined surface S**3** and the second connecting part **129**. The first connecting member **122***d* and the second connecting member **127***d* are aligned to each other on the first axis L**1**. The number of pad **114***d* in this embodiment is one, and pad **114***d* is located on the top surface A**1** of the circuit board **110***a*. The two horizontal parts **125***a* and **125***b* are in contact with the pad **114***d*, so that the circuit board **110***a* is coupled to the plate **121**.

[0043] As shown in FIG. **12**, the user may disassemble and assemble the circuit board **110***a* and the metal casing **120***d* through a tool **200**. The tool **200** has a cylindrical shape matching the shape of the opening **112***a*. FIG. **12** schematically illustrates the tool **200** located in the opening **112***a* with a dashed line. During the assembly process of the circuit board **110***a* and the metal casing **120***d*, the tool **200** may be in contact with the first inclined surface S**1** and the third inclined surface S**3** and move toward the plate **121**, so that the first connecting member **122***d* and the second connecting member **127***d* are relatively close. The first connecting member **122***d* and the second connecting member **127***d* are partially located inside the tool **200**. Then, the circuit board

110*a* may be moved close to the plate **121**, so that the opening **112***a* of the circuit board **110***a* is aligned with the tool **200**, and the circuit board **110***a* is moved to the position of FIG. **12**. Finally, the tool **200** is removed, and the first connecting member **122***d* and the second connecting member **127***d* return to their positions in FIG. **10** to engage with the circuit board **110***a*.

[0044] In the process of disassembling circuit board **110***a* from the metal casing **120***d*, the tool **200** is first inserted into the opening **112***a*. At this time, the first inclined surface S**1** and the third inclined surface S**3** are pushed by the tool **200**, so that the first connecting member **122***d* and the second connecting member **127***d* are close to each other and located inside the tool **200**. The first connecting member **122***d* and the second connecting member **127***d* disengage from the circuit board **110***a*. Then, the circuit board **110***a* may move along the second axis L**2** away from the metal casing **120***d* and be disassembled.

[0045] In addition, the first convex part **123***d* of the first connecting member **122***d* and the second convex part **128***d* of the second connecting member **127***d* may also be manually pushed to be close to each other, so that the metal casing **120***d* and the circuit board **110***a* may be disassembled and assembled without tools. The electronic component **100***d* of this embodiment has the same effect as the embodiment mentioned above and will not be described again.

[0046] FIG. **13** is a schematic cross-sectional view of an electronic component of another embodiment of this disclosure. FIG. **14** is a top view of an electronic component according to another embodiment of this disclosure. Please refer to FIG. **11**, FIG. **13**, and FIG. **14** simultaneously. The electronic component **100***e* of this embodiment is similar to the embodiment mentioned above. The difference between the two is that the number of opening **112***b* of the circuit board **110***b* of this embodiment is one, and the shape of the opening **112***b* is a rectangle. In this embodiment, the number of the pads **114***el* and **114***e***2** is two. The two pads **114***e***1** and **114***e***2** are arranged on the top surface A**1** of the circuit board **110***b* and are located next to the opening **112***b*. The pad **114***el* corresponds to the first connecting member **122***e*, and the pad **114***e***2** corresponds to the second connecting member **127***e*.

[0047] From the perspective of FIG. **14**, the first convex part **123***e* of the first connecting member **122***e* may be regarded as the projection of the horizontal part **125***a* on the circuit board **110***b*, and the second convex part **128***e* of the second connecting member **127***e* may be regarded as the projection of the horizontal part **125***b* on the circuit board **110***b*. The projection of the horizontal parts **125***a* and **125***b* onto the top surface A**1** of the circuit board **110***b* has a length D**1** along the first axis L**1**. A length D**2** of the pads **114***e***1** and **114***e***2** along the first axis L**1** is smaller than the length D**1** of the corresponding horizontal parts **125***a* and **125***b*. The length D**1** is, for example, 1 mm, but is not limited thereto.

[0048] The surface area of the opening **112***b* of the circuit board **110***b* is smaller than the surface area of the opening **112***a* of the circuit board **110***a* (see FIG. **11**). Thus it is possible to reduce the space requirement in the situation of the assembly of the metal casing **120***e* and the circuit board **110***b*, so that the circuit board **110***b* may have a larger space for wiring and component installation. The electronic component **100***e* of this embodiment has the same effect as the embodiment mentioned above and will not be described again.

[0049] In addition, as shown in FIG. **14**, the width D**4** of the pads **114***e***1** and **114***e***2** perpendicular along the first axis L**1** is greater than the width D**3** of the corresponding horizontal parts **125***a* and **125***b*, but is not limited thereto. In an embodiment not shown, the width of the pads **114***e***1** and **114***e***2** may be smaller than or equal to the width of the corresponding horizontal parts **125***a* and **125***b*.

[0050] FIG. **15** is a schematic cross-sectional view of an electronic component of another embodiment of this disclosure. FIG. **16** is a top view of the electronic component of FIG. **15**. Please refer to FIG. **13**, FIG. **15** and FIG. **16** simultaneously. The electronic component **100***f* of this embodiment is similar to the embodiment mentioned above. The difference between the two is that the circuit board **110***c* of this embodiment includes two openings **112***cl* and **112***c***2** and two pads **114***f***1** and **114***f***2**. The two pads **114***f***1** and **114***f***2** are respectively arranged next to the corresponding two openings **112***cl* and **112***c***2**. The first connecting member **122***f* of the metal casing **120***f* is set up to pass through the opening **112***cl* and contact the pad **114***f***1**, and the second connecting member **127***f* is set up to pass through the opening **112***c***2** and contact the pad **114***f***2**. The two openings **112***c***1** and **112***c***2** of the circuit board **110***c* have a smaller surface area, so that the circuit board **110***c* may have a larger space for wiring and component installation. The electronic component **100***f* of this embodiment has the same effect as the embodiment mentioned above and will not be described again.

[0051] The set ups and connection relationships of the first connecting member, the second connecting member, the opening, and the pad are not limited to the embodiments mentioned above. The user may set up the first connecting member, the second connecting member, the opening, and the pad according to their requirements.

[0052] To sum up, the metal casing of the electronic component of this disclosure is detachably connected to the circuit board through the first connecting member and the second connecting member. The first connecting member and the second connecting member are in contact with the pad of the circuit board so that the circuit board is electrically connected to the plate. The circuit board is easy to assemble onto the metal casing or disassemble from the metal casing.

What is claimed is:

1. An electronic component comprising:

a circuit board, comprising at least one opening and at least one pad; and

a metal casing, wherein the circuit board is detachably connected to the metal casing, the metal casing comprises a plate and a first connecting member and a second connecting member, the plate is connected to the first connecting member and the second connecting member, the first connecting member and the second connecting member partially pass through the at least one opening and are connected to the circuit board, the first connecting member and the second connecting member are in contact with the at least one pad, so that the circuit board is electrically connected to the plate.

2. The electronic component according to claim **1**, wherein the plate and the first connecting member and the second connecting member are integrated as a whole.

3. The electronic component according to claim **1**, wherein the first connecting member and the second connecting member are staggered on a first axis, and the first axis is parallel to the plate.

4. The electronic component according to claim 1, wherein the first connecting member and the second connecting member are aligned with each other on a first axis, and the first axis is parallel to the plate.

5. The electronic component according to claim 1, wherein the first connecting member comprises a first convex part and a first connecting part connected to each other, at least part of the first connecting part is located in the at least one corresponding opening, the first convex part is exposed on the circuit board from the at least one opening.

6. The electronic component according to claim 5, wherein the first convex part comprises a first inclined surface, the first inclined surface faces away from the circuit board, and the first inclined surface is pushed by a bottom surface of the circuit board, so that the first connecting member is moved closer to the second connecting member, the bottom surface faces the plate.

7. The electronic component according to claim 6, wherein the first convex part comprises a second inclined surface, the second inclined surface faces the circuit board, and the second inclined surface is pushed by a top surface of the circuit board, so that the first connecting member is moved closer to the second connecting member, and the top surface faces away from the plate.

8. The electronic component according to claim 6, wherein the first convex part comprises a horizontal part, the horizontal part is connected to the first inclined surface and is parallel to a first axis, and the first axis is parallel to the plate.

9. The electronic component according to claim 5, wherein the first convex part comprises an arc surface.

10. The electronic component according to claim 5, wherein the first connecting member further comprises a positioning part, the positioning part is connected between the first connecting part and the plate in a bending manner, the positioning part is adapted to block the circuit board from moving along a second axis, the second axis is perpendicular to the circuit board.

11. The electronic component according to claim 1, wherein each of the at least one pad is connected to an inner wall surface of each of the at least one corresponding opening.

12. The electronic component according to claim 1, wherein each of the at least one pad surrounds each of the at least one opening and is located on a top surface of the circuit board, and the top surface faces away from the plate.

13. The electronic component according to claim 1, wherein each of the at least one pad comprises a first part and a second part connected to each other, the first part is located on a top surface of the circuit board, and the second part is connected to an inner wall surface of each of the at least one corresponding opening, the top surface faces away from the plate.

14. The electronic component according to claim 13, wherein the first connecting member comprises a first convex part and a first connecting part connected to each other, the first convex part contacts the first part, and the first connecting part contacts the second part.

15. The electronic component according to claim 1, wherein the number of the at least one opening is two, the number of the at least one pad is two, and the first connecting member is set up to pass through one of the two openings and contacts one of the two pads, wherein the second connecting member is set up to pass through the other of the two openings and contacts the other of the two pads.

16. The electronic component according to claim 1, wherein a projection part of at least one of the first connecting member and the second connecting member to the circuit board is located in the opening.

17. The electronic component according to claim 1, wherein the second connecting member comprises a second convex part and a second connecting part connected to each other, at least part of the second connecting part is located in the at least one corresponding opening, the second convex part is exposed on the circuit board from the at least one opening.

18. The electronic component according to claim 17, wherein the second connecting member further comprises a positioning part, the positioning part is connected between the second connecting part and the plate in a bending manner, the positioning part is adapted to block the circuit board from moving along a second axis, the second axis is perpendicular to the circuit board.

19. The electronic component according to claim 17, wherein the second convex part of the second connecting member comprises a third inclined surface, and the third inclined surface faces away from the circuit board.

20. The electronic component according to claim 1, wherein the circuit board is coupled to the plate through the first connecting member and the second connecting member and is grounded.

* * * * *