

SMALL-SIZED HIGH-CURRENT ELECTRICAL CONNECTOR AND MATCHING CONNECTOR THEREOF

TECHNICAL FIELD

The present invention relates to the technical field of connectors, and specifically, to a small-sized high-current electrical connector and a matching connector thereof.

BACKGROUND

Currently, server inter-board connectors are generally large-sized in order to ensure sufficient current-carrying capacity.

Electrical connector products of the same type generally have unlocking structures that require close-range operation, such as side-press locking or locking buckling.

The inter-board connectors with the above structures have the following disadvantages:

Under high-current conditions, the connectors are over-sized, which is not conducive to the development of server miniaturization and integration.

When a plug and a socket are matched, the locking structure involving side-press locking or locking buckling is disadvantageous for unlocking when operating in confined space.

SUMMARY

To solve the above technical problems, the present invention provides a small-sized high-current electrical connector and a matching connector thereof.

The objectives of the present invention are achieved by the following technical solutions. A small-sized high-current electrical connector proposed according to the present invention includes an insulator and a contact inserted into the insulator, where the insulator is provided with a locking groove extending along an insertion direction of the connector, and the locking groove is used for matching and locking with a locking claw of a matching connector; the insulator is further provided with a sliding pressure plate that slides in the insertion direction; when the locking claw of the matching connector matches with the locking groove, the sliding pressure plate is capable of sliding to a locking position that prevents the locking claw of the matching connector from disengaging from the locking groove.

Furthermore, a side wall of the locking groove is provided with a snap slot for engaging.

Furthermore, an elastic member allowing the sliding pressure plate to move towards an

insertion end is provided on the insulator.

Furthermore, a stop structure is provided at an end of the insulator away from the insertion end, and a stop extending in the insertion direction is provided on a side of the stop structure that faces the insertion end; a channel is provided on a side of the sliding pressure plate away from the insertion end; the channel and the stop are movable relative to each other; and a spring, with one end pressing against a stop end surface and the other end pressing against a side wall of the channel near the insertion end, is provided in the channel.

Furthermore, an outer surface of the insulator is provided with an inner chute extending along the insertion direction and connected to the locking groove, and outer chutes located on both sides of the inner chute and extending along the insertion direction; a side wall of the inner chute is provided with an inner slide rail extending along the insertion direction, and a side wall of the outer chute is provided with an outer slide rail extending along the insertion direction; the sliding pressure plate is slidably arranged in the inner chute and the outer chute, and is in sliding fit with the outer slide rail and the inner slide rail; stop bosses are provided on the inner slide rail and the outer slide rail to limit the movement range of the sliding pressure plate; and the sliding pressure plate matches with the outer chute, so that two sides of the sliding pressure plate do not protrude from two sides of the insulator.

Furthermore, the sliding pressure plate is connected to a pull strap at an end away from the insertion end.

Furthermore, the insulator has a cavity extending along the insertion direction, a mounting groove for inserting the contact is provided in the cavity, and the contact is a sheet-like contact; the sheet-like contact is provided with a limit groove extending in a direction perpendicular to the insertion direction; after the sheet-like contact is inserted into the mounting groove, a stuffing block is inserted into the limit groove, and the stuffing block is also inserted into the insulator.

Furthermore, a portion of the sheet-like contact away from the insertion end is bent, and the bent portion is provided with a pin extending out of the insulator and connected to a printed circuit board (PCB).

A connector matching with the small-sized high-current electrical connector includes an insulator and a jack structure inserted into the insulator, where a gap is reserved in the jack structure to insert the corresponding connector; a locking claw is inserted into the insulator, the locking claw includes a claw extending in an insertion direction, and the claw is provided with a claw protrusion for engaging on one side and reserved with a space on the other side.

Furthermore, the jack structure is a bent structure, an elastic claw in contact with a contact is provided on one side of the jack structure, a first socket pin that penetrates from the insulator and

is not parallel to the insertion direction is provided on the other side of the jack structure, and the first socket pin is connected to a PCB.

Furthermore, an elastic claw in contact with a contact is provided at an insertion end of the jack structure, a second socket pin extending in a direction opposite to the insertion direction is provided on a side of the jack structure away from the insertion end, and the second socket pin is connected to the PCB.

Furthermore, the jack structure is forcibly mounted in a cavity of the insulator through barbs, and a width of the cavity of the insulator at an insertion inlet end matches with a thickness of the jack structure.

Compared with the prior art, the beneficial effects of the present invention are as follows:

The small-sized high-current electrical connector and the matching connector thereof have a small size, high current-carrying capacity, and high space utilization, making them conducive to the development of server miniaturization.

The small-sized high-current electrical connector and the matching connector thereof employ a pull ring locking structure when the both match, thereby ensuring the reliability of wire-to-board application scenarios and facilitating unlocking in narrow space operations.

The above description is merely a summary of the technical solutions of the present invention. In order to have a clearer understanding of the technical means of the present invention, the present invention can be implemented according to the content of the specification. In order to make the above and other objectives, features, and advantages of the present invention more obvious and understandable, the following preferred embodiments are given in detail with accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1a is a schematic diagram of an embodiment of a connection plug of the present invention;

FIG. 1b is a schematic diagram of an embodiment of a board-soldered plug of the present invention;

FIG. 1c is a schematic diagram of an embodiment of a curved board-soldered socket of the present invention;

FIG. 1d is a schematic diagram of an embodiment of a vertical board-soldered socket of the present invention;

FIG. 2a is an exploded schematic diagram of an embodiment of the connection plug of the present invention;

FIG. 2b-1 is a schematic diagram of engagement between a plug insulator in FIG. 2a and a locking claw on a socket side;

FIG. 2b-2 is a schematic diagram after the plug insulator, sliding pressure plate, and pull strap in FIG. 2a engage with the locking claw on the socket side ;

FIG. 2c-1 is a schematic diagram of assembly of the plug insulator and sliding pressure plate in FIG. 2a;

FIG. 2c-2 is a side view of FIG. 2c-1;

FIG. 2c-3 is a cross-sectional view of point A in FIG. 2c-2;

FIG. 2d-1 is a top view of the plug insulator in FIG. 2a;

FIG. 2d-2 is a bottom view of the sliding pressure plate in FIG. 2a;

FIG. 2d-3 is a half cross-sectional view of an embodiment of the connection plug of the present invention in an initial state;

FIG. 2d-4 is a half cross-sectional view of an embodiment of the connection plug of the present invention in an unlocked state;

FIG. 3 is an exploded schematic diagram of an embodiment of the board-soldered plug of the present invention;

FIG. 4a is an exploded schematic diagram of an embodiment of the curved board-soldered socket of the present invention;

FIG. 4b is a schematic diagram of engagement between jack structures in FIG. 4a and contacts on a plug side;

FIG. 5a is an exploded schematic diagram of an embodiment of the vertical board-soldered socket of the present invention;

FIG. 5b is a rear view of an embodiment of the vertical board-soldered socket of the present invention;

FIG. 6a is a schematic diagram of engagement between the connection plug and the curved board-soldered socket in the present invention;

FIG. 6b is a schematic diagram of engagement between the connection plug and the vertical board-soldered socket in the present invention; and

FIG. 6c is a schematic diagram of engagement between the board-soldered plug and the curved board-soldered socket in the present invention.

[Reference numerals]

11 - connection plug, 12 - board-soldered plug, 101 - first plug insulator, 10101 - locking groove, 10102 - snap slot, 10103 - stop structure, 10104 - outer slide rail, 10105 - stop boss, 10106 - stop, 10107 - inner slide rail, 10108 - mounting groove, 10109 - inner chute, 10110 - outer chute,

10111 - stop end surface, 102 - first contact, 10201 - limit groove I, 103 - first contact, 10301 - limit groove II, 104 - stuffing block, 105 - sliding pressure plate, 10501 - locking protrusion, 10502 - channel, 106 - spring, 107 - pull strap, 108 - second plug insulator, 109 - second contact. 110 - second contact, 111 - plug pin, 112 - rib plate, 21 - curved board-soldered socket, 22 - vertical board-soldered socket, 201 - first socket insulator, 20101 - mounting hole, 202 - first jack structure, 203 - first jack structure, 204 - locking claw, 20401 - claw, 20402 - claw protrusion, 20403 - mounting cantilever, 20404 - mounting protrusion, 205 - second socket insulator, 206 - second jack structure, 207 - second jack structure, 208 - first socket pin, 209 - second socket pin, 210 - elastic claw, 3 - horizontal PCB, 4 - vertical PCB, 5 - cable.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The technical solutions in the embodiments of the present invention will be clearly and completely described below in conjunction with the accompanying drawings therein. Apparently, the described embodiments are only some of the embodiments of the present invention, not all of them. All other embodiments obtained by those of ordinary skilled in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present invention.

As shown in FIG. 1a to FIG. 1d, a small-sized high-current electrical connector in the present invention involves two embodiments: a connection plug 11 and a board-soldered plug 12 on a plug side. A socket matching with the small-sized high-current electrical connector also involves two embodiments: a curved board-soldered socket 21 and a vertical board-soldered socket 22 on a socket side. The following describes the embodiments of the connection plug 11, the board-soldered plug 12, the curved board-soldered socket 21, and the vertical board-soldered socket 22, respectively. In other embodiments, the structure of the plug side and the structure of the socket side can be interchanged as needed, and details will not be repeated here.

The structure of the connection plug 11 is shown in FIG. 2a to FIG. 2d-4. Taking the orientation shown in the figures as an example for illustration, the connection plug 11 includes a first plug insulator 101, a sliding pressure plate 105, plug contacts, a stuffing block 104, a spring 106, and a pull strap 107. In this embodiment, the plug contacts include a first contact 102 and a first contact 103. An insertion end of the first plug insulator 101 has an opening. The plug contacts extend into a cavity inside the first plug insulator 101, so that the plug contacts inside the first plug insulator 101 can be inserted into jack structures in the socket. The other end of the first plug insulator 101 away from the insertion end has an opening for inserting a cable 5, and the cable is connected to the plug contacts after being inserted.

An upper part of the first plug insulator 101 has a locking portion extending in an insertion direction. The locking portion matches with the sliding pressure plate 105 to achieve engagement and locking with a locking claw 204 on the socket, as shown in FIG. 2b-2. The locking portion has a locking groove 10101 extending in the insertion direction. The locking groove 10101 is located at the insertion end of the first plug insulator 101 and extends through to an insertion end surface of the first plug insulator 101. Two side walls of the locking groove 10101 are provided with snap slots 10102. When engaging with the socket, the locking claw 204 on the socket side snaps into the snap slots 10102.

The upper part of the first plug insulator 101 is further provided with an inner chute 10109 that communicates with the locking groove 10101 and extends in the insertion direction, two side walls of the inner chute 10109 are provided with inner slide rails 10107 extending in the insertion direction, a stop structure 10103 is provided at an end of the inner chute 10109 away from the insertion end, outer chutes 10110 are provided on both sides of the inner chute 10109 on the upper part of the first plug insulator 101, and side walls of the outer chutes 10110 are provided with outer slide rails 10104 extending in the insertion direction. The sliding pressure plate 105 is slidably arranged in both the inner chute 10109 and the outer chute 10110, and is in sliding fit with the inner slide rail 10107 and the outer slide rail 10104. The sliding fit structure may be a groove-block structure, that is, the block on the sliding pressure plate 105 slides in the grooves on the inner slide rail 10107 and the outer slide rail 10104, or the groove on the sliding pressure plate 105 receives the block sliding on the inner slide rail 10107 and the outer slide rail 10104. Both ends of the outer slide rail 10104 and the inner slide rail 10107 are provided with stop bosses 10105 to limit the movement range of the sliding pressure plate 105. The engagement between the insulator and the sliding pressure plate 105 ensures stable functionality of the sliding pressure plate 105 on the basis of connector miniaturization, thereby preventing instable locking because related structures for the locking function (including the inner chute 10109, the outer chutes 10110, the inner slide rails 10107, the outer slide rails 10104, the locking groove 10101, and the snap slots 10102) become smaller due to the small size of the connector. Meanwhile, the inner slide rails 10107 and the outer slide rails 10104 enable the sliding pressure plate 105 not to disengage from the plug insulator during assembly, achieving basic fixation.

The outer chutes 10110 are provided on both sides of the first plug insulator 101, and a lower part of the sliding pressure plate 105 matches the outer chutes 10110 and slidably cooperates with the outer slide rails 10104. In this embodiment, two sides of the sliding pressure plate 105 are aligned with two sides of the first plug insulator 101. This structure can greatly reduce the size of the sliding pressure plate 105 in a width direction. In this case, the width of the sliding pressure

plate 105 is consistent with the width of the first plug insulator 101, which reduces the size of the connector and is beneficial to the space utilization of a server where the connector is located.

The stop structure 10103 includes two parallel stops 10106, and the stops 10106 extend along the insertion direction and face the insertion end. In other embodiments, one or more stops 10106 may be designed. The lower part of the sliding pressure plate 105 that matches the inner chute 10109 is provided with a channel 10502 and a cavity that matches the stop structure 10103 to accommodate the stop structure 10103. The channel 10502 extends in the insertion direction and penetrates the sliding pressure plate 105 at the end away from the insertion end. The channel 10502 is movably fitted over the stop 10106. The spring 106 is arranged in the channel 10502. One end of the spring 106 abuts against a side wall of the channel 10502 near the insertion end, and the other end abuts against an end surface of the stop 10106.

Due to the miniaturization of the connector, the spring 106 is small in both size and diameter. When the spring 106 is compressed, because of machining tolerances of the spring 106 and structural tolerances of the connector, and because the spring 106 may still deform under a small force, even if the direction of the compressive force coincides as much as possible with the axis of the spring 106, the spring 106 may still be subjected to an external force that does not coincide with the axis of the spring 106, so that the spring 106 bends. When the bending reaches a certain extent, the spring 106 may undergo plastic deformation or be stuck inside the connector, rendering the spring 106 unable to move the sliding pressure plate 105 toward the insertion end, thereby rendering the sliding pressure plate 105 unable to achieve a locking function. Therefore, in this embodiment, the spring 106 is limited within the channel 10502 to avoid bending when the spring 106 is subjected to other external forces, so that the spring 106 will only compress in the extension direction of the channel 10502 when the spring 106 is subjected to a compressive force, thereby avoiding the failure of the sliding pressure plate 105 caused by bending of the spring 106. Meanwhile, the channel 10502 and the stop 10106 are movably fitted with each other, with the stop 10106 being movably inserted through the channel 10502, so that the stop 10106 moves along the extension direction of the channel 10502. Thus, when moving the sliding pressure plate 105, the compressive force on the spring 106 can be applied along the extension direction of the channel 10502, thereby limiting the direction of the force acting on the spring 106 and preventing the spring 106 from being affected by external forces. In other embodiments, the spring 106 may be other elastic members, such as elastic pads stacked in the extension direction.

In other embodiments, the channel 10502 with an opening facing the insertion end and extending in the insertion direction may be provided on the stop structure 10103, the channel 10502 may be designed as a blind hole, the spring 106 is inserted into the blind hole. the stop

10106 extending away from the insertion end is provided on the sliding pressure plate 105, the stop 10106 is slidably inserted into the blind hole, one end of the spring 106 presses against a bottom surface of the blind hole and the other end presses against an end surface of the stop 10106, which can also achieve the technical effect of limiting the spring 106 as described above.

In another embodiment, the stop 10106 extending towards the insertion end is provided on the stop structure 10103, the spring 106 is fitted onto the stop, the channel 10502 is provided on the sliding pressure plate 105, the stop 10106 is movably inserted through the channel 10502, one end of the spring 106 presses against a stop end surface 10111 of the stop structure 10103 near the insertion end and the other end presses against an end face of the sliding pressure plate 105 away from the insertion end, thereby limiting the spring 106 through the stop 10106.

In another embodiment, the stop 10106 extending towards the insertion end is provided on the stop structure 10103, the stop 10106 is slidably arranged in the channel 10502 on the sliding pressure plate 105, one end of the spring 106 can be fitted and fixed on the stop 10106 and the other end can be pressed against a side wall of the channel 10502 near the insertion end, where the entire spring 106 is arranged in the channel 10502, and the spring 106 is limited.

In another embodiment, when the overall structure of the connector is relatively large, the spring 106 is large-sized and less prone to deformation. Therefore, the stop 10106 on the stop structure 10103 and the channel 10502 on the sliding pressure plate 105 can be canceled. The sliding pressure plate 105 is slidably arranged on the first plug insulator 101, and the spring 106 is arranged between the stop structure 10103 and the sliding pressure plate 105. One end of the spring 106 presses against an end surface of the sliding pressure plate 105 away from the insertion end, and the other end presses against an end surface of the stop structure 10103 near the insertion end.

A locking protrusion 10501 is provided at the end of the sliding pressure plate 105 near the insertion end. When the locking claw 204 is inserted into the snap slot 10102, under the elastic force of the spring 106, the sliding pressure plate 105 slides towards the insertion end, and the locking protrusion 10501 is inserted between two claws 20401 of the locking claw 204. The locking protrusion 10501 is in a locking position to prevent the claws 20401 from moving out of the snap slot 10102, achieving the locking of the plug and the socket and ensuring the reliability of connection in wire-to-board scenarios.

The pull strap 107 is arranged at the end of the sliding pressure plate 105 away from the insertion end. One end of the pull strap 107 is connected to the sliding pressure plate 105, and the other end is a handle for easy operation. During the unlocking process of the plug and the socket, the pull strap 107 is pulled to drive the sliding pressure plate 105 to move toward a direction opposite to the insertion direction, overcoming the elastic force of the spring 106. In this case, the

stop 10106 cooperates with the channel 10502 to limit the spring 106, the locking protrusion 10501 disengages from the locking claw 204, and the locking claw 204 disengages from the limitation of the locking protrusion 10501, so that the plug side can be pulled out. Before the plug is inserted into the socket, the pull strap 107 is first pulled in the direction opposite to the insertion direction to provide space for inserting the locking claw 204 into the locking groove 10101. Then the locking claw 204 is inserted into the locking groove 10101, and the claws 20401 are engaged in the snap slot 10102. Next, the pull strap 107 is released, and the sliding pressure plate 105 will return to its original position due to the potential energy of the spring 106. The locking protrusion 10501 will be engaged between the locking claws 204 to achieve locking. Through the pull strap 107, locking and unlocking within a small space can be achieved.

The slide rails inside and outside the first plug insulator 101 and the stop structure 10103 cooperate with the sliding pressure plate 105 and the channel 10502 as well as the spring 106, thereby preventing the sliding pressure plate 105 from coming out, and also avoiding the current situation of using the same type of electrical connector stops, pull rods, insulators, and locking structures separately. No additional pull rod is required, which not only reduces the quantity of parts, but also further reduces the size of the connector.

The first contacts installed in the first plug insulator 101 are sheet-like contacts, including the first contact 102 and the first contact 103 symmetrically arranged on both sides. The first contact 102 and the first contact 103 are vertically inserted into mounting grooves 10108 inside the cavity of the first plug insulator 101 along the insertion direction. The first contact 102 and the first contact 103 are respectively provided with a limit groove I 10201 and a limit groove II 10301, and the extension direction of the limit grooves is perpendicular to the insertion direction. The inner cavity of the first plug insulator 101 is provided with a rib plate 112 that separates the two contacts. The rib plate 112 extends out of the cavity of the first plug insulator 101 and forms a guide structure at the end for inserting the plug into the socket. The mounting grooves 10108 extend along with the rib plate 112 out of the cavity of the first plug insulator 101. After the two first contacts are inserted into the corresponding mounting grooves 10108, the stuffing block 104 is sequentially inserted into the limit groove I 10201, a hole on the rib plate 112, and the limit groove II 10301 to limit front and rear positions. When the connection plug is inserted into the socket, the first contacts are inserted into the jack structures of the socket. A tail solder wire of the first contact is electrically connected to the cable 5 to achieve current transmission.

The structure of the board-soldered plug is shown in FIG. 3, including a second plug insulator 108, second contacts, and a stuffing block 104. The second contacts are sheet-like contacts, including a second contact 109 and a second contact 110. A portion of the second contact away

from the insertion end is bent into a U shape to reduce the size of the plug, and the bent portion is provided with a plug pin 111 extending in a direction perpendicular to the insertion direction. The plug pin 111 extends out from a lower part of the second plug insulator 108 after the second contact is installed. The installation method for the second contact in the second plug insulator 108 is the same as that for the first contact. The second contact is vertically inserted into mounting grooves in the cavity of the second plug insulator 108, and the second contact is separated by a rib plate 112. The rib plate 112, the mounting grooves, and the second contact extend out of the cavity of the second plug insulator 108 for easy insertion into the socket. In addition, the movement in the insertion direction is limited by the stuffing block 104 to ensure product reliability. The portion of the second contact away from the insertion end is bent into a U-shaped structure, with a gap between two edges of the U-shaped structure, leaving enough space for the installation of the stuffing block 104. A front end of the second plug insulator 108 is inserted into the socket, and a lower end is soldered to a printed circuit board (PCB) through the plug pins 111 of the second contact to form a current path. An upper part of the second plug insulator 108 is provided with a cavity for cooperating with a locking claw 204. The cooperating structure between the locking claw 204 and the second plug insulator 108 is similar to that between the locking claw 204 and the first plug insulator 101. Since the solder joint is soldered to the PCB, no locking structure is required to ensure that the plug and the socket will not move relative to each other. Therefore, only the locking groove 10101 and snap slot 10102 for inserting the locking claw 204 need to be provided on the upper part of the second plug insulator 108. In other embodiments, if the solder joint moves with the PCB, in order to ensure firm insertion, the locking groove 10101, snap slots 10102, inner chutes 10109, outer chutes 10110, inner slide rails 10107, outer slide rails 10104, stop bosses 10105, stop structure 10103, sliding pressure plate 105, etc. on the connection plug can be arranged on the board-soldered plug. The cooperating relationship between the above structure and the locking claw 204 is the same as that between the connection plug and the locking claw 204, ensuring tight insertion of the board-soldered plug into the corresponding socket.

The curved board-soldered socket 21, as shown in FIG. 4a to FIG. 4b, includes a first socket insulator 201, a locking claw 204, and first jack structures. The first jack structures include a first jack structure 202 and a first jack structure 203. The first jack structure is a sheet-like structure and bent to form a U-shaped structure, reducing the length of the socket. The first jack structure R202 and the first jack structure L203 are symmetrically arranged in the first socket insulator 201. One side of the first jack structure is an insertion end used for contact fit with the contact in the plug. The insertion ends of the first jack structures are arranged opposite to each other. The first jack structure 202 and the first jack structure 203 are formed to engage with the contacts in the

plug. The contacts in the plug are inserted between the two jack structures. The other side of the first jack structure is a pin end for being connected to the PCB, and a plurality of first socket pins 208 perpendicular to the insertion direction are distributed on the pin end. A front end of the first socket insulator 201 mates with the plug, and a lower end is soldered to a PCB through the first socket pins 208 to form a current path. After the plug is inserted into the socket, the first jack structures clamp the contacts in the plug for current transmission.

Upper and lower sides of the first jack structure 202 and the first jack structure 203 are provided with barbed structures for vertical forced mounting inside the first socket insulator 201.

The locking claw 204 is inserted into the first socket insulator 201, the locking claw 204 includes two claws 20401 extending in the insertion direction, and the two claws 20401 are distributed and symmetrically arranged in a left-right direction. The claw 20401 has a cantilever structure extending towards the insertion end, a claw protrusion 20402 is provided at an end of the claw 20401, and the claw protrusions 20402 of the two claws 20401 face outward. A space is reserved between the two claws 20401. When the plug is inserted into the socket, the claw protrusions 20402 are inserted into the snap slots 10102 on the plug, and the locking protrusion 10501 is inserted between the two claws 20401 to prevent the claws 20401 from disengaging from the plug due to elastic deformation, thereby locking the plug and the socket. In order to ensure smooth insertion of the claw protrusions 20402 into the snap slots 10102, the cross-sectional shape of the claw protrusions 20402 is trapezoidal, with the narrow side facing outward, and the shape of the snap slots 10102 matches the shape of the claw protrusions 20402. When the plug and the socket are unlocked, the plug and the socket are separated, the surface of the claw protrusion 20402 that matches the snap slot 10102 in the separation direction is an inclined surface, facilitating the disengagement of the claw protrusion 20402 from the snap slot 10102.

A mounting cantilever 20403 extending in the insertion direction is provided between the two claws 20401 of the locking claw 204, and a mounting protrusion 20404 is provided on a side where an end of the mounting cantilever 20403 faces upward. A top of the first socket insulator 201 is provided with a mounting hole 20101. When the locking claw 204 is inserted into the first socket insulator 201, the mounting protrusion 20404 on the mounting cantilever 20403 is subjected to pressure, and the mounting cantilever 20403 undergoes elastic deformation. After the locking claw 204 is mounted in place, the mounting protrusion 20404 is inserted into the mounting hole 20101, and the mounting cantilever 20403 restores to its original state, thereby firmly inserting the locking claw 204 into the first socket insulator 101.

In other embodiments, a snap slot 10102 is provided on the claw 20401, and a claw protrusion 20402 is provided on a side wall of the locking groove 10101. When the claw 20401 is inserted,

the claw 20401 undergoes elastic deformation, so that the claw protrusion 20402 is inserted into the snap slot 10102.

The vertical board-soldered socket 22, as shown in FIG. 5a to FIG. 5b, includes a second socket insulator 205, a locking claw 204, and a second jack structure. The locking claw 204 in the vertical board-soldered socket 22 has the same structure and mounting method as the locking claw 204 in the curved board-soldered socket, so details will not be repeated here. The second jack structure is a sheet-like contact, which can reduce the size of the socket. The second jack structure includes a second jack structure 206 and a second jack structure 207 arranged symmetrically. Insertion ends of the second jack structure 206 and the second jack structure 207 form jack structures engaging with the contacts on the plug. The contacts in the plug are vertically inserted between the two jack structures. The second jack structure 206 and the second jack structure 207 are provided with second socket pins 209 extending in the insertion direction at the end away from the insertion end, and the second socket pins 209 are connected to a vertical PCB. A front end of the second socket insulator 108 mates with the plug, and a rear end is soldered to the PCB through the second socket pins 209 to form a current path.

Upper and lower sides of the second jack structure 206 and the second jack structure 207 are provided with barbed structures, and the second jack structures are fixed in the cavity of the second socket insulator 108 through vertical forced mounting. In this embodiment, each second jack structure is provided with two elastic claws 210 distributed vertically. To reduce the shaking of the second jack structures, the cavity at an insertion inlet end of the second socket insulator 108 away from the insertion end is designed in a "figure-eight" shape, with wider upper and lower sides for easy insertion of the elastic claws 210 and a narrower middle for limiting the second jack structures. When the second jack structure 206 and the second jack structure 207 are assembled, the upper and lower elastic claws 210 enter from the wider upper and lower "squares" of the "figure-eight" shape. After assembly, the middle narrowing position of the cavity at the insertion inlet end of the second socket insulator 205 matches the narrowest positions of the second jack structures, the upper and lower parts of the second jack structures are matched and limited with the upper and lower parts of the cavity at the insertion inlet end of the second socket insulator 108 through the barbed structures, and the middle parts of the second jack structures are matched and limited with the middle part of the cavity at the insertion inlet end of the second socket insulator 108, thereby preventing the second jack structures from shaking in the second socket insulator 108.

The application scenarios of the above four connectors are shown in FIG. 6a to FIG. 6c, including wire-to-board and board-to-board applications. The four small-sized connectors can achieve a maximum current-carrying capacity of up to 40A in the scenarios. In the wire-to-board

application scenario, the cable 5 is connected to the connection plug 11, and the connection plug 11 mates with both the curved board-soldered socket 21 and the vertical board-soldered socket 22. The curved board-soldered socket 21 is inserted into a horizontal PCB 3, while the vertical board-soldered socket 22 is inserted into a vertical PCB 4, facilitating socket adaption to various space scenarios. The pins of the socket are soldered to the PCB, thereby achieving wire-to-board current transmission.

In the board-to-board application scenario, the pins of the board-soldered plug 12 are connected to a horizontal PCB 3, the other end of the board-soldered plug is inserted into the curved board-soldered socket 21, and the pins of the curved board-soldered socket 21 are connected to another horizontal PCB 3, thereby achieving board-to-board current transmission. The curved board-soldered socket 21 can mate with both the board-soldered plug 12 and the connection plug 11, enabling convenient switching between wire-to-board and board-to-board applications.

The small-sized high-current electrical connector and the matching socket thereof have a small size, high current-carrying capacity, and high space utilization, making them conducive to the development of server miniaturization.

The small-sized high-current electrical connector and the matching socket thereof employ a pull ring locking structure when a plug and a socket are matched, thereby ensuring the reliability of wire-to-board application scenarios and facilitating unlocking in narrow space operations.

Although the embodiments of the present invention are shown and described, a person skilled in the art can appreciate that various changes, modifications, substitutions, and variations can be made to these embodiments without departing from the principles and spirit of the present invention. The scope of the present invention is defined by the appended claims and equivalents thereof.

What is claimed is:

1. A small-sized high-current electrical connector, comprising an insulator and a contact inserted into the insulator, wherein the insulator is provided with a locking groove (10101) extending along an insertion direction of the connector, and the locking groove (10101) is used for matching and locking with a locking claw (204) of a matching connector; the insulator is further provided with a sliding pressure plate (105) that slides in the insertion direction; when the locking claw of the matching connector matches with the locking groove, the sliding pressure plate is capable of sliding to a locking position that prevents the locking claw of the matching connector from disengaging from the locking groove.

2. The small-sized high-current electrical connector according to claim 1, wherein a side wall of the locking groove is provided with a snap slot (10102) for engaging.

3. The small-sized high-current electrical connector according to claim 1, wherein an elastic member allowing the sliding pressure plate (105) to move towards an insertion end is provided on the insulator.

4. The small-sized high-current electrical connector according to claim 3, wherein a stop structure (10103) is provided at an end of the insulator away from the insertion end, and a stop (10106) extending in the insertion direction is provided on a side of the stop structure (10103) that faces the insertion end; a channel (10502) is provided on a side of the sliding pressure plate (105) away from the insertion end; the channel (10502) and the stop (10106) are movable relative to each other; and a spring (106), with one end pressing against an end surface of the stop (10106) and the other end pressing against a side wall of the channel (10502) near the insertion end, is provided in the channel (10502).

5. The small-sized high-current electrical connector according to claim 1, wherein an outer surface of the insulator is provided with an inner chute (10109) extending along the insertion direction and connected to the locking groove (10101), and outer chutes (10110) located on both sides of the inner chute and extending along the insertion direction; a side wall of the inner chute (10109) is provided with an inner slide rail (10107) extending along the insertion direction, and a side wall of the outer chute (10110) is provided with an outer slide rail (10104) extending along the insertion direction; the sliding pressure plate (105) is slidably arranged in the inner chute (10109) and the outer chute (10110), and is in sliding fit with the outer slide rail (10104) and the inner slide rail (10107); stop bosses (10105) are provided on the inner slide rail and the outer slide rail to limit the movement range of the sliding pressure plate; and the sliding pressure plate matches with the outer chute, so that two sides of the sliding pressure plate do not protrude from two sides of the insulator.

6. The small-sized high-current electrical connector according to claim 1, wherein the sliding pressure plate (105) is connected to a pull strap (107) at an end away from the insertion end.

7. The small-sized high-current electrical connector according to claim 1, wherein the insulator has a cavity extending along the insertion direction, a mounting groove (10108) for inserting the contact is provided in the cavity, and the contact is a sheet-like contact; the sheet-like contact is provided with a limit groove (10201/10301) extending in a direction perpendicular to the insertion direction; after the sheet-like contact is inserted into the mounting groove (10108), a stuffing block (104) is inserted into the limit groove, and the stuffing block (104) is also inserted into the insulator.

8. The small-sized high-current electrical connector according to claim 7, wherein a portion of the sheet-like contact away from the insertion end is bent, and the bent portion is provided with a pin extending out of the insulator and connected to a printed circuit board (PCB).

9. A connector matching with the small-sized high-current electrical connector, comprising an insulator and a jack structure inserted into the insulator, wherein a gap is reserved in the jack structure to insert the corresponding connector; a locking claw (204) is inserted into the insulator, the locking claw (204) comprises a claw (20401) extending in an insertion direction, and the claw (20401) is provided with a claw protrusion (20402) for engaging on one side and reserved with a space on the other side.

10. The connector matching with the small-sized high-current electrical connector according to claim 9, wherein the jack structure is a bent structure, an elastic claw in contact with a contact is provided on one side of the jack structure, a first socket pin (208) that penetrates from the insulator and is not parallel to the insertion direction is provided on the other side of the jack structure, and the first socket pin is connected to a PCB.

11. The connector matching with the small-sized high-current electrical connector according to claim 9, wherein an elastic claw in contact with a contact is provided at an insertion end of the jack structure, a second socket pin (209) extending in a direction opposite to the insertion direction is provided on a side of the jack structure away from the insertion end, and the second socket pin is connected to the PCB.

12. The connector matching with the small-sized high-current electrical connector according to claim 11, wherein the jack structure is forcibly mounted in a cavity of the insulator through barbs, and a width of the cavity of the insulator at an insertion inlet end matches with a thickness of the jack structure.