

ELECTROSTATIC PROTECTION COVER

FIELD OF THE INVENTION

The present invention relates to an electrostatic protection cover for
5 and/or engaged with an electrical connector and wherein such a cover preferably
also provides facility for suction device pick up and placement of the connector
and/or the cover.

BACKGROUND OF INVENTION

10 The use of electrostatic protection covers for electrical connectors is
common. Electrical connectors which may provide an interface and electrical
connection for a plurality of circuits between two electrical devices are typified
by for example US6116949. Such a connector is normally engaged to a lower
printed circuit board and presents conductive elements to be engaged by an
15 electrical device such as another printed circuit board, PC card. The connector
allows for an electrical connection to be made between circuits provided by the
lower printed circuit board and the upper device. Prior to such an upper device
being engaged with the connector it can be important that direct contact with
individual conductive elements of the connector is voided. Such contact for
20 example by a person, may be sufficient for electrostatic discharge to occur from
the person to some of the conductive elements thereby establishing a flow of
electricity through the lower printed circuit board. This may be detrimental to
the integrity of the electrical device. Accordingly it is desirable for an electrical
connector to be presented before use in a protective manner wherein a grounding
25 of all of the conductive elements is able to be provided so that the effect of any
electrostatic discharge is minimised, reduced or eliminated.

US6116949 illustrates a protective cover for an electrical connector
which consists of a conductive sheet metal material able to engage directly with
all of the conductive element simultaneously. The device also presents an upper
30 surface of a kind which allows for a machine engagement to be made with the
protective cover for a machine handling of the cover and connector.

As the type of connector with which such an electrostatic protection cover
is engaged is of a compressive connection kind (meaning that the conductive
elements are compressed upon engagement of the upper electric device to ensure
35 that a good connection is created) the electrostatic cover can take advantage of
this compressive connection feature in generating a good connection between the

cover and the conductive elements. However with the type of cover as shown in US6116949, all of the conductive elements engage simultaneously with a substantially rigid region of the cover. Depending on the number of conductive elements presented from the connector, the downward pressure required to be
5 provided by the cover for engagement to the connector can be undesirably large. The force for applying and retaining such prior art covers is transmitted directly between the pin contact regions of the connector. Such a large force can be undesirable in that it can cause damage to the electrical conductors or create distortion and bending of the lower circuit board during the engagement of the
10 electrostatic protection cover. Likewise, in order to ensure the cover remains engaged with the connector a strong clipping force is required which, when the cover is to be removed, needs to be overcome. The cover can hence also cause undesirable effects during its removal.

Accordingly it is an object of the present invention to provide an
15 electrostatic protection cover which overcomes at least the abovementioned disadvantages or which will at least provide the public with a useful choice.

BRIEF DESCRIPTION OF THE INVENTION

In a first aspect the present invention consists in an electrostatic
20 protection cover for press fitting onto an electrical connector of a kind having at least one array of a plurality of compressive conductive elements said electrostatic protection cover comprising:

a main body including an upper section to be positioned adjacent the
upper surface of said electrical connector and electrically engaging
25 contact sections of the electrical contacts,

at least one grounding leg dependent from said main body and
positioned therefrom so that a resiliently deflectable portion of said
at least one grounding leg can become engaged by at least one
conductive element and upon engagement to be deflected from a
30 previously undeflected condition

clipping means for removably securing said main body to said electrical connector.

Preferably said clipping means includes at least two resilient legs
extending from said main body each for engagement with an opposite side of
35 the electrical connector.

Preferably said clipping means includes a further pair of legs extending

downwardly from the upper section of said main body to engage with a further pair of legs receiving region of the upper surface of said electrical connector.

Preferably said at least two resilient legs are to locate said main body in a direction lateral to the direction in which said further pair of legs provides
5 location of said main body when viewed in a direction downwardly onto said electrostatic protection cover.

Preferably said at least two resilient legs are downwardly dependent from said main body and have an outwardly splayed (relative to each other) distal end.

Preferably the main body section includes said upper section of a
10 substantially quadrilateral outline and side sections extending from opposed sides of said upper section thereby forming a U-shaped profile.

Preferably a plurality of grounding legs are provided, one for a respective conductive element, and each extending from a said side section in a cantilevered manner each having a fixed end engaged to said side section and a
15 distal end.

Preferably said plurality of grounding legs extend from both said side sections.

Preferably the distal ends of said plurality of grounding legs from both side sections are positioned inwardly of said U-shaped profile.

20 Preferably said at least one grounding leg is positioned to engage with externally presented contact regions of each said conductive element.

Preferably said side sections are engaged with said upper section at both distal ends of said sides.

Preferably said connector has been formed by bending from a stamped
25 sheet metal material.

Preferably said upper section includes a planar region with which a suction pressure pick-up tool can engage for the machine handling of said connector.

In a second aspect the present invention consists in an electrical connector
30 of a kind having at least one array of a plurality of conductive elements located by an insulating housing for providing an electrical connection between electrical circuit traces of two electrical devices wherein said electrical connector has an electrostatic protection cover engaged thereto, to create a short between all conductive elements, said electrostatic protection cover comprising

35 a main body including an upper section to be positioned adjacent the upper surface of said electrical connector and electrically

connected to contact sections of the electrical contacts,
at least one grounding leg dependent from said main body in a
resiliently deflectable manner, each engaged by an at least one
conductive element and biased thereto as a result of having been
5 deflected clipping means for removably securing said main body to
said electrical connector.

This invention may also be said broadly to consist in the parts, elements
and features referred to or indicated in the specification of the application,
individually or collectively, and any or all combinations of any two or more of
10 said parts, elements or features, and where specific integers are mentioned herein
which have known equivalents in the art to which this invention relates, such
known equivalents are deemed to be incorporated herein as if individually set
forth.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an electrostatic protection cover of the
present invention before engagement with a connector,

Figure 2 is a perspective view of a connector with which the electrostatic
protection cover of figure 1 is able to engage,

20 Figure 3 is a perspective view of the electrostatic protection cover and the
connector of figures 1 and 2 in an engaged condition,

Figure 4 is a detailed view of part of the electrostatic protection cover and
connector in an engaged condition, and

25 Figure 5 is a perspective view of a cover wherein individual legs are
provided for engagement with several conductive elements.

DETAILED DESCRIPTION OF THE INVENTION

With reference to figure 1, a preferred form of the electrostatic protection
cover 1 is shown. The cover is of a kind which is engageable to a connector as
30 for example shown in figure 2. The connector 2 is engaged or engageable to a
lower printed circuit board (not shown) or other electrical device and provides a
plurality of conductive elements 4 which each engage to an electrical trace of the
printed circuit board at one region thereof and present a contact region 3 for
engagement with electrical traces of an upper electrical device (not shown) to be
35 engaged therewith.

The electrical connector 2 has an upper region 13, side region 14 and end
regions 15 and locates a plurality of conductive elements 4 normally in an array

or two arrays as for example shown in figure 2. Each conductive element can provide a connection of separate electrical traces between the upper and lower electrical devices. The connector is of a kind which presents the conductive elements so that they are compressive in nature upon engagement of the upper device with the connector. The upper contact region 3 is deflected downwardly when the upper device is engaged for use with the connector and are then biased towards the upper device to ensure good connectivity is created. The connector of the present invention may come in the form as for example shown in figure 2 or may alternatively be pre-applied to a printed circuit board.

10 The electrostatic protection cover 1 is engageable to the connector but is removable therefrom immediately prior to the connector being used for providing electrical connection between the lower and upper electrical devices. The cover 1 is an integral member of a conductive material such as a metal and provides a short between each of the conductive elements of the connector when
15 engaged with the connector. It is preferably of a metal which has good resistance to plastic deformation. The cover is releasably engaged with the connector wherein the application and removal of the cover is in an up/down direction relative to the connector. The cover is engaged with the connector by a pressing action and contact of the cover with the conductive elements is
20 achieved in a compressive manner.

The cover consists of a main body 5 which includes an upper section 6 and side section 7. The side section 7 extends from opposite sides of the upper region 6 substantially downwardly therefrom. The effect is to provide in side view a substantially U shaped cover.

25 Presented from the main body are a plurality of legs 8 which are engaged from the main body in a cantilevered arrangement so that they provide a region engageable with individual conductive elements in a resiliently deflectable manner. As shown in figure 1, the legs extend from the side sections of the main body and extend inwardly in respect of the U section shaped cover. The legs 8
30 have preferably a distal end 16 which is resiliently displaceable. At or between the distal end and the cantilevered end, the legs are to make contact with for example the upper contact region 3 of the conductive elements 4. Each leg of the cover may be provided to engage with at least one conductive element of the connector. Indeed in the most preferred form a leg is provided for connection
35 with one conductive element only.

Figure 5 shows a leg engaged with several conductive elements. The legs are still independently deflectable relative to the upper section and the clipping

feature but perhaps of a more rigid form.

The connector 1 also includes clipping features such as provided by legs 9 and 10. The legs 9 preferably extend from the main body on the side section thereof to be engaged with leg receiving regions 11 with which they can engage in a clip or snap fit arrangement. The legs 9 are preferably provided with outwardly splayed distal ends so that a convenient engagement of the cover can be provided with the connector. Likewise the legs 10 can be provided to engage with a connection region 12 of the connector which may be provided at an upper region thereof. The legs 10 may be provided as a snap or clip fit features or alternatively may be provided merely as a location means to locate the cover relative to the connector in the longitudinal direction (the direction to which both the upper and side sections of the body portion are parallel to). Preferably this longitudinal direction is transverse to the direction to which the legs 9 locate the cover with the connector. The legs 10 may be provided in a resiliently deflectable manner from the upper section of the main body so that a rigid location of the cover with the connector can be provided by such legs.

In moving to the fully engaged condition of the cover with the connector, the legs 8 make contact with the conductive elements and are deflected upwardly relative to the main body. Such upward deflection of each leg 8 is independent from the legs 9 and 10. As the legs 8 are able to deflect upward during the movement of the cover downwardly onto the connector, the force that is transmitted to the legs 8 is reduced and hence the force that the legs apply onto the conductive elements is also reduced. This in turn will reduce the likelihood of damage occurring to the conductive elements as they experience a reduced contact force by the legs 8.

As the legs 8 are flexible relative to the main body of the cover, they will make contact with the conductive elements at all times with a light force. Such a light application force will reduce any large deflection of the conductive elements and hence reduce the possibility of their damage. Since the force experienced by the legs 8 is largely localised the retention features are able to act independently on the connector.

It is to be appreciated that the legs 8 may be provided in a different form which is appropriate to the particular design of connector it is to engage with. Some connector may present conductive elements where the lower terminals are engaged onto a PCB and the upper terminals are presented for compression engagement in a sideways (parallel to the PCB) direction as opposed to a downward direction.

The legs 8 may hence be presented from the body portion of the cover to be deflectable side ways.

The benefit is that it prevents any unnecessary stress being applied to the compressible conductive elements before actual application and the retention
5 force required to retain the cover to the connector is reduced in comparison with a cover without the leg design of the present invention. This in turn will reduce the cover assembly force, the cover removal force, prevent damage or scratching of the housing, simplify the retention feature design and save cost on cover material since it may be mode of a reduced thickness and/or lower grade
10 material.



CLAIMS

1. An electrostatic protection cover for press fitting onto an electrical connector of a kind having at least one array of a plurality of compressive
5 conductive elements said electrostatic protection cover comprising:
a main body including an upper section to be positioned adjacent the upper surface of said electrical connector and electrically engaging contact sections of the electrical contacts,
at least one grounding leg dependent from said main body and
10 positioned therefrom so that a resiliently deflectable portion of said at least one grounding leg can become engaged by at least one conductive element and upon engagement to be deflected from a previously undeflected condition
clipping means for removably securing said main body to said electrical
15 connector.
2. An electrostatic protection cover as claimed in claim 1 wherein said clipping means includes at least two resilient legs extending from said main body each for engagement with an opposite side of the electrical connector.
3. An electrostatic protection cover as claimed in claim 1 wherein said
20 clipping means includes a further pair of legs extending downwardly from the upper section of said main body to engage with a further pair of legs receiving region of the upper surface of said electrical connector.
4. An electrostatic protection cover as claimed in claim 3 wherein said at least two resilient legs are to locate said main body in a direction lateral to the
25 direction in which said further pair of legs provides location of said main body when viewed in a direction downwardly onto said electrostatic protection cover.
5. An electrostatic protection cover as claimed in any one of claims 1 to 4 wherein said at least two resilient legs are downwardly dependent from said main body and have an outwardly splayed (relative to each other) distal end.



6. An electrostatic protection cover as claimed in any one of claims 1 to 5 wherein the main body section includes said upper section of a substantially quadrilateral outline and side sections extending from opposed sides of said upper section thereby forming a U-shaped profile.
- 5 7. An electrostatic protection cover as claimed in claim 1 wherein a plurality of grounding legs are provided, one for a respective conductive element, and each extending from a said side section in a cantilevered manner each having a fixed end engaged to said side section and a distal end.
8. An electrostatic protection cover as claimed in claim 7 wherein said
10 plurality of grounding legs extend from both said side sections.
9. An electrostatic protection cover as claimed in claim 7 or 8 wherein the distal ends of said plurality of grounding legs from both side sections are positioned inwardly of said U-shaped profile.
10. An electrostatic protection cover as claimed in claim 1 wherein said at
15 least one grounding leg is positioned to engage with externally presented contact regions of each said conductive element.
11. An electrostatic protection cover as claimed in claim 6 wherein said side sections are engaged with said upper section at both distal ends of said sides.
12. An electrostatic protection cover as claimed in any one of claims 1 to 11
20 wherein said connector has been formed by bending from a stamped sheet metal material.
13. An electrostatic protection cover as claimed in any one of claims 1 to 12 wherein said upper section includes a planar region with which a suction pressure pick-up tool can engage for the machine handling of said connector.
- 25 14. An electrical connector of a kind having at least one array of a plurality of conductive elements located by an insulating housing for providing an electrical connection between electrical circuit traces of two electrical devices wherein said electrical connector has an electrostatic protection cover engaged thereto, to create a short between all conductive elements, said electrostatic protection cover
30 comprising



a main body including an upper section to be positioned adjacent the upper surface of said electrical connector and electrically connected to contact sections of the electrical contacts,

5 at least one grounding leg dependent from said main body in a resiliently deflectable manner, each engaged by an at least one conductive element and biased thereto as a result of having been deflected clipping means for removably securing said main body to said electrical connector.

10 15. A printed circuit board mounting an electrical connector as claimed in claims 1 to 13.

16. An electrostatic protection cover as herein described with reference to figure 1.