

LOW-PROFILE EDGE CARD CONNECTOR

This invention relates to an edge card connector, and more particularly to a low-profile edge card connector.

Referring to Figs. 1 and 2, a conventional edge card connector 9 is used in a desktop computer to interconnect a circuit board 901 and an electronic card 902. The conventional edge card connector 9 includes an elongated vertical dielectric housing 91 and a plurality of conductive terminals 92. The housing 91 has a card-receiving slot 911 extending along a longitudinal direction of the housing 91, and two sidewalls 912 defining the card-receiving slot 911 therebetween. Each of the sidewalls 912 is formed with a plurality of terminal-receiving slots 913 for receiving the terminals 92, respectively. Each of the terminals 92 have a fixed section 921 fixed in the corresponding terminal-receiving slot 913, a curved resilient section 922 extending from and disposed above the fixed section 921, and a solder section 923 extending from and disposed under the fixed section 921.

Referring to Fig. 3, the fixed sections 921 has a height (h1) along a vertical direction. The card-receiving slot 911 has a bottom end spaced apart from the bottom end of the housing 91 by a vertical distance (h2). As such, the vertical distance (h2) must be greater than the height (h1), thereby resulting in a substantial increase in the height of the edge card connector 9 as a whole. Such a connector

is disclosed in US Patent Numbers 5609502, 6012952, 4439000, 4934961, and 6071152, and goes against current trends toward miniaturization in computer design.

Therefore, the object of this invention is to provide
5 a low-profile edge card connector.

According to this invention, a low-profile edge card connector comprises:

an elongated dielectric housing having a card-receiving slot extending along a horizontal longitudinal direction of the dielectric housing, and two sidewalls defining the
10 card-receiving slot therebetween, the card-receiving slot allowing insertion of an electronic card thereinto, each of the sidewalls having an inner side surface proximate to the card-receiving slot, an outer side surface distal from the card-receiving slot and opposite to the inner side
15 surface along a horizontal transverse direction perpendicular to the longitudinal direction, and a plurality of terminal-receiving slots extending from the inner side surface to the outer side surface; and

20 a plurality of conductive terminals disposed respectively within the terminal-receiving slots, each of the conductive terminals having a fixed section that is fixed within the corresponding terminal-receiving slot and that extends along the transverse direction, a resilient
25 section extending from and disposed above one end of the fixed section, and a solder section extending from and disposed below the other end of the fixed section and

outwardly of the dielectric housing, the resilient section having a contact portion extending into the card-receiving slot for electrical contact with the electronic card.

5 Since the fixed sections of the terminals extend along the transverse direction perpendicular to a direction in which the electronic card is inserted into the housing, the height of the edge card connector is reduced significantly.

10 These and other features and advantages of this invention will become apparent in the following detailed description of the preferred embodiments of this invention, with reference to the accompanying drawings, in which:

15 Fig. 1 is an exploded perspective view of a conventional edge card connector, an electronic card, and a circuit board;

Fig. 2 is a fragmentary, partly sectional, perspective view of the conventional edge card connector, illustrating an dielectric housing and two terminals;

20 Fig. 3 is a schematic sectional view of the conventional edge card connector, illustrating specific dimensions of the connector;

Fig. 4 is a partly exploded perspective view of the first preferred embodiment of a low-profile edge card connector according to this invention;

25 Fig. 5 is a fragmentary, partly sectional, exploded perspective view of the first preferred embodiment;

Fig. 6 is a fragmentary, partly sectional, assembled

top perspective view of the first preferred embodiment;

Fig. 7 is a fragmentary, partly sectional, assembled bottom perspective view of the first preferred embodiment;

Fig. 8 is a schematic sectional view of the first preferred embodiment, illustrating positioning of two terminals relative to an dielectric housing;

Fig. 9 is a fragmentary, partly sectional, exploded perspective view of the second preferred embodiment of a low-profile edge card connector according to this invention;

Fig. 10 is a fragmentary, partly sectional, assembled perspective view of the second preferred embodiment, illustrating positioning of two terminals relative to an dielectric housing; and

Fig. 11 is a schematic sectional view of the first preferred embodiment, illustrating positioning of the two terminals relative to the dielectric housing.

Before the present invention is described in greater detail in connection with the preferred embodiments, it should be noted that similar elements and structures are designated by like reference numerals throughout the entire disclosure.

Referring to Figs. 4 to 8, the first preferred embodiment of a low-profile edge card connector 1 according to this invention includes an dielectric housing 2 and a plurality of conductive terminals 3. The dielectric housing 2 is elongated, and has a card-receiving slot 24

extending along a horizontal longitudinal direction (X) of the dielectric housing 2 and allowing insertion of an electronic card 8 thereinto, two sidewalls 21 defining the card-receiving slot 24 therebetween, a bottom wall 22 interconnecting the bottom ends of the sidewalls 21, and two retainers 23 disposed respectively and pivotally on two opposite ends of the dielectric housing 2 for retaining the electronic card 8 on the dielectric housing 2.

Each of the sidewalls 21 has an inner side surface 211 proximate to the card-receiving slot 24, an outer side surface 212 distal from the card-receiving slot 24 and opposite to the inner side surface 211 along a horizontal transverse direction (Y) perpendicular to the longitudinal direction (X), and a plurality of terminal-receiving slots 25 extending from the inner side surface 211 to the outer side surface 212. As such, the card-receiving slot 24 is in spatial communication with the terminal-receiving slots 25. Each of the terminal-receiving slots 25 has a vertical main slot portion 250 (see Fig. 5), two bottom longitudinal extensions 251 extending respectively from two opposite sides of the bottom end of the main slot portion 250 along the longitudinal direction (X) and away from each other, and two top longitudinal extensions 252 extending respectively from two opposite sides of the top end of the main slot portion 250 along the longitudinal direction (X) and away from each other. Each of the top longitudinal extensions 252 has a closed end 253 (see Fig. 7) and an

open end 254 that is opposite to the closed end 252 along the transverse direction (Y) and that is formed in the outer side surface 212.

5 The terminals 3 are disposed respectively within the terminal-receiving slots 25 in the housing 2. Each of the terminals 3 has a fixed section 31 fixed within the bottom longitudinal extensions 251 of the corresponding terminal-receiving slot 25 and extending along the transverse direction (Y), a resilient section 32 extending
10 from and disposed above one end of the fixed section 31, and a U-shaped solder section 33 extending from and disposed below the other end of the fixed section 31 and outwardly of the housing 2. One of the terminals 3 will be described in the succeeding paragraph.

15 The fixed section 31 is wider than the resilient section 32, and has two opposite sides disposed respectively within the bottom longitudinal extensions 251 of the corresponding terminal-receiving slot 25 in the housing 2. The two opposite sides of the fixed section 31 are sized so as to
20 prevent vertical movement thereof within the bottom longitudinal extensions 251, and are formed respectively with two barb units 311 extending away from each other and in contact with vertical wall surfaces of the corresponding sidewall 21 defining the bottom longitudinal extensions
25 251 to prevent movement of the fixed section 31 within the corresponding terminal-receiving slot 25. The resilient section 32 has a contact portion 321 extending into the

card-receiving slot 24 for electrical contact with the electronic card 8, and a horizontal T-shaped top end 322 parallel to the fixed section 31. The T-shaped top end 322 has two opposite sides 323 disposed respectively within the top longitudinal extensions 252 of the corresponding terminal-receiving slot 25, is sized to prevent vertical movement of the T-shaped top end 322 within the top longitudinal extensions 252, and abuts against wall portions of the corresponding sidewall 21 defining the closed ends 253 of the top longitudinal extensions 252 of the corresponding terminal-receiving slot 25. As such, a preload is applied to the terminal 3. The resilient section 32 further has an inclined guiding portion 324, which is disposed between the T-shaped top end 322 and the contact portion 321 to facilitate insertion of the electronic card 8 into the card-receiving slot 24. The solder section 33 has a bottom end disposed under and abutting against the housing 2 and soldered to a circuit board. Alternatively, the solder section 33 may have a shape that is the same as that of the solder section 923 (see Fig. 2) of the above-mentioned conventional edge card connector 9 (see Fig. 2) so as to insert through a hole in a circuit board.

With particular reference to Fig. 8, since the fixed sections 31 of the terminals 3 extend along the horizontal transverse direction (Y) perpendicular to a vertical direction (Z), in which the electronic card 8 (see Fig.

4) is inserted into the housing 2, their height (h3) is determined simply by their thickness. As a result, the vertical distance (h4) between the bottom ends of the card-receiving slot 24 and the housing 2 and, thus, the height of the edge card connector 1 can be reduced significantly.

Figs. 9, 10, and 11 show the second preferred embodiment of a low-profile edge card connector according to this invention, which is similar in construction to the first preferred embodiment. In this embodiment, each of the sidewalls 21 has a top wall 214 defining the top ends of the terminal-receiving slots 25, and a stop portion 215 extending downwardly from the top wall 21 into each of the terminal-receiving slots 25 and adjacent to the corresponding inner side surface 211. Each of the terminals 3 has a top end 322' abutting against the corresponding stop portion 215 so that a preload is applied to the corresponding resilient section 32.

CLAIMS:

1. A low-profile edge card connector comprising:

an elongated dielectric housing having a card-receiving slot extending along a horizontal longitudinal direction of the dielectric housing, and two sidewalls defining the card-receiving slot therebetween, the card-receiving slot allowing insertion of an electronic card thereinto, each of the sidewalls having an inner side surface proximate to the card-receiving slot, an outer side surface distal from the card-receiving slot and opposite to the inner side surface along a horizontal transverse direction perpendicular to the longitudinal direction, and a plurality of terminal-receiving slots extending from the inner side surface to the outer side surface; and a plurality of conductive terminals disposed respectively within the terminal-receiving slots, each of the conductive terminals having a fixed section that is fixed within the corresponding terminal-receiving slot and that extends along the transverse direction, a resilient section extending from and disposed above one end of the fixed section, and a solder section extending from and disposed below the other end of the fixed section and outwardly of the dielectric housing, the resilient section having a contact portion extending into the card-receiving slot for electrical contact with the electronic card.

2. The low-profile edge card connector as claimed in Claim 1, wherein each of the terminal-receiving slots has a vertical main slot portion, and two bottom longitudinal extensions extending respectively from two opposite sides of the bottom end of the main slot portion along the longitudinal direction and away from each other, the fixed section of each of the conductive terminals having two opposite sides that are disposed respectively within the bottom longitudinal extensions and that are sized to prevent vertical movement of the fixed section within the bottom longitudinal extensions.
3. The low-profile edge card connector as claimed in Claim 2, wherein the fixed section of each of the conductive terminals is formed with two barb units extending respectively from the two opposite sides thereof and away from each other and in contact with the corresponding sidewall.
4. The low-profile edge card connector as claimed in Claim 1, wherein:
- each of the terminal-receiving slots has a vertical main slot portion, and two top longitudinal extensions extending respectively from two opposite sides of the top end of the main slot portion along the longitudinal direction and away from each other; and
- each of the conductive terminals further has a horizontal T-shaped top end parallel to the corresponding fixed section and having two opposite

sides that are disposed respectively within the top longitudinal extensions of the corresponding terminal-receiving slot and that are sized to prevent vertical movement of the T-shaped top end within the top longitudinal extensions of the corresponding terminal-receiving slot.

5. The low-profile edge card connector as claimed in Claim 4, wherein each of the top longitudinal extensions has a closed end and an open end that is opposite to the closed end along the transverse direction and that is formed in the outer side surfaces of the corresponding sidewall, the T-shaped top end of each of the conductive terminals abutting against wall portions of the corresponding sidewall defining the closed ends of the corresponding top longitudinal extension such that a preload is applied to the corresponding conductive terminal.
6. The low-profile edge card connector as claimed in Claim 1, wherein the solder section of each of the conductive terminals extends from the corresponding fixed section, is generally U-shaped, and has a bottom end disposed under and abutting against the dielectric housing.
7. The low-profile edge card connector as claimed in Claim 1, wherein each of the sidewalls has a top wall defining the top ends of the terminal-receiving slots, and a stop portion extending from the top wall into each of the terminal-receiving slots and adjacent to the inner side surface, each of the conductive terminals having a top

end abutting against the stop portion so that a preload is applied to the corresponding resilient section.

5 8. The low-profile edge card connector as claimed in Claim 1, wherein the resilient section of each of the conductive terminals further has a top end extending away from the card-receiving slot and parallel to the corresponding fixed section.

9. The low-profile edge card connector as claimed in Claim 8, wherein the top ends of the conductive terminals are
10 T-shaped.

10. The low-profile edge card connector as claimed in Claim 9, wherein:

each of the terminal-receiving slots has a vertical main slot portion, and two top longitudinal extensions
15 extending respectively from two opposite sides of the top end of the main slot portion along the longitudinal direction and away from each other; and

the T-shaped top end is parallel to the corresponding fixed section, and has two opposite sides disposed
20 respectively within the top longitudinal extensions of the corresponding terminal-receiving slot and sized to prevent vertical movement of the T-shaped top end within the top longitudinal extensions of the corresponding terminal-receiving slot.

25 11. The low-profile edge card connector as claimed in Claim 10, wherein each of the top longitudinal extensions has a closed end and an open end that is opposite to the closed

end along the transverse direction and that is formed in the outer side surfaces of the corresponding sidewall, the T-shaped top end of each of the conductive terminals abutting against wall portions of the corresponding sidewall defining the closed ends of the corresponding top longitudinal extension such that a preload is applied to the corresponding conductive terminal.

12. The low-profile edge card connector as claimed in Claim 8, wherein the solder section of each of the conductive terminals extends from the corresponding fixed section, is generally U-shaped, and has a bottom end disposed under and abutting against the dielectric housing.