IMPEDANCE CONTROLLED ELECTRICAL CONTACT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This claims priority to U.S. Patent Application Serial No. 62/816,865 filed March 11, 2019, the disclosure of which is hereby incorporated by reference as if set forth in its entirety herein.

BACKGROUND

[0002] Electrical connectors include an electrically conductive electrical contact that is configured to be placed in electrical communication with first and second electrical components so as to allow data transfer between the first and second electrical components. A radio frequency (RF) electrical contact has a mounting end that is typically mounted to a coaxial cable, and a mating end that typically mates to a printed circuit board, thereby placing the coaxial cable and the printed circuit board in electrical communication with each other. The RF electrical contact can form a separable interface with the printed circuit board.

[0003] Certain types of RF contacts include an outer electrical conductor, an inner electrical conductor, and an electrically insulative spacer disposed between the inner and outer electrical conductors. The inner electrical conductor is configured to mate with the printed circuit board, and further configured to be mounted to the electrical signal conductor of the coaxial cable. The outer electrical conductor is configured to mount to an outer electrical shield or ground of the coaxial cable. In some RF contacts, the inner conductor is movable and spring biased. Accordingly, as the mating end of the inner conductor is placed against the printed circuit board, the spring becomes compressed, thereby applying a biasing force to the inner conductor against the printed circuit board.

[0004] However, movement of the inner electrical conductor of conventional RF contacts can cause impedance to vary along the length of the electrical contact. It is therefore desired to provide an electrical RF contact having a movable inner conductor while achieving a substantially constant impedance profile along its length.

SUMMARY OF THE INVENTION

[0004a] According to a first aspect of the present invention, there is provided an electrical contact comprising:

a stationary electrical contact member; and

a movable electrical contact member that is movable with respect to the stationary electrical contact member from an initial position to a mated position, wherein the movable electrical contact member has an outer surface that is in contact with the stationary electrical

contact member both in the initial position and the mated position, and at all positions between the initial position and the mated position,

wherein the electrical contact is configured to conduct RF signals within 10 percent of a target impedance both when the movable electrical contact member is in the initial position and when the movable electrical contact member is in the mated position.

[0004b] According to a second aspect of the present invention, there is provided an electrical contact comprising:

a stationary electrical contact member; and

a movable electrical contact member that is movable with respect to the stationary electrical contact member from an initial position to a mated position,

wherein the movable electrical contact member contacts a contact location of the stationary electrical contact member as the movable electrical contact member moves from the initial position to the mated position, and the contact location of the stationary electrical contact member is stationary as the movable electrical contact member moves from the initial position to the mated position.

[0004c] According to a third aspect of the present invention, there is provided an electrical contact comprising:

a stationary electrical contact member; and

a movable electrical contact member that is movable with respect to the stationary electrical contact member from an initial position to a mated position, wherein the movable electrical contact member is in contact with the stationary electrical contact member both in the initial position and the mated position, and at all positions between the initial position and the mated position,

wherein the electrical contact is configured to transmit RF signals through approximately 67 GHz.

[0004d] According to a fourth aspect of the present invention, there is provided an electrical contact comprising:

an electrically conductive outer housing; and

an inner electrical contact including:

a stationary inner electrical contact member that defines first and second cantilevered arms that terminate at a distal end of the stationary inner electrical contact member; and

a movable inner electrical contact member that is movable with respect to the stationary electrical contact member from an initial position to a mated position, wherein the movable electrical contact member is in contact with the cantilevered arms both in the initial position and the mated position, and at all positions between the initial position and the mated position,

wherein the electrically conductive outer housing defines a first zone having a first inner cross-sectional dimension, and a second zone having a second inner cross-sectional dimension that is greater than the first inner cross-sectional dimension, and

wherein the distal end of the stationary inner electrical contact member is disposed in the second transition zone of the electrically conductive outer housing.

[0004e] According to a fifth aspect of the present invention, there is provided an electrical contact comprising:

a stationary electrical contact member; and

a movable electrical contact member that is movable with respect to the stationary electrical contact member from an initial position to a mated position, wherein the movable electrical contact member is in contact with the stationary electrical contact member both in the initial position and the mated position,

wherein the electrical contact is configured to conduct RF signals within 10 percent of a target impedance both when the movable electrical contact member is in the initial position and when the movable electrical contact member is in the mated position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Fig. 1 is a perspective view of an array of RF electrical contacts supported by an array housing;

[0006] Fig. 2A is a perspective view of an RF electrical contact of the RF electrical contacts of Fig. 1 shown in an initial configuration prior to being mated with a printed circuit board;

[0007] Fig. 2B is a perspective view of the RF electrical contact illustrated in Fig. 2A, but shown in a mated configuration when mated with a printed circuit board;

[0021]

[0022]

DETAILED DESCRIPTION

[0023] Referring to Figs. 1-2D, an array 10 of electrical contacts 20 can include a plurality of electrical contacts 20 and an array housing 12 that supports the electrical contacts 20. In particular, the array housing 12 can support the electrical contacts 20 such that the electrical contacts 20 are aligned with each other along one or more columns and one or more rows that are substantially perpendicular to the one or more columns. That is, respective central axes 31 (see Fig. 3A) of the electrical contacts 20 can be aligned with each other along one or more columns and one or more rows. The array housing 12 defines a front end 13 and a rear end 15 opposite the front end 13 along a longitudinal direction that is perpendicular to each of the columns and rows. The front end 13 is spaced from the rear end 15 in a forward direction. Conversely, the rear end 15 is spaced from the front end 13 in a rearward direction opposite the forward direction.

[0024] Each of the electrical contacts 20 can include a signal contact member that defines a first or signal mating end 23, and a ground contact member 14 that defines a second or ground mating end 25. In particular, each of the electrical contacts can include an outer housing 22 that defines the ground contact member 14. The outer housing 22 includes an outer housing body 27, and the ground mating end 25 projects out from outer housing body 27. The signal mating end 23 and the ground mating end 25 can each project out from the front end 13 in the forward direction. In particular, the array housing 12 defines an aperture 16 that extends through the front end 13. The signal mating end 23 and the ground mating end 25 extend through the aperture 16 in the forward direction. Further, the front end 13 defines an internal surface 17 that defines the aperture 16.