

SPECIFICATION

1. Title of the Invention:

A CIRCUIT BOARD CONNECTOR, AND A DOUBLE MOUNT CIRCUIT BOARD
HAVING SUCH A CONNECTOR

2. Detailed Description of the Invention:

[0001]

[Field of the Invention]

The present invention relates to a connector fixed to a circuit board, and to a circuit board on which such a connector is mounted.

[0002]

[Background Art]

A power supply circuit for a personal computer supplies various types of power signals and control signals to other circuits in a system in order to effect a reduction in the consumption of power by the system. But since, in contrast to other system circuits, a power supply circuit is composed of a number of components that require relatively large supplies of power, the effect that the electric power carried in the power supply circuit has on other system circuits constitutes a problem. To reduce this effect, and also to lower manufacturing costs, a structure is frequently employed whereby one circuit board that has a power supply circuit is attached by a connector to another circuit board that has no power supply circuit. Since the second circuit board has no power supply circuit to supply power to its various resident circuits, these circuits are driven by power that is received from the first board. And as a result, a connector is required that can not only permit the exchange of signals between circuit boards, but can also

facilitate the supply of power to a circuit board that has no resident power supply circuit.

[0003]

Fig. 1 is a perspective view of a conventional connector equipped with surface mount terminals. Since a power signal must have a larger current than an ordinary control signal in order to drive circuits on a circuit board to which the current is supplied, in many cases, as is shown in Fig.1, a plurality of surface mount terminals are provided parallelly to supply power.

[0004]

The number of terminals provided on a power supply circuit connector for a personal computer tends to increase in accordance with an increase in the frequency of a CPU. In addition, the number of terminals provided on a conventional connector is further increased because a plurality of terminals are allocated for the supply of a power signal. Therefore, the number of terminals to be mounted on a circuit board is increased, and the acquisition, at the design stage of a circuit board, of a required wiring area

is not easy. This tends to adversely affect the saving of space on a circuit board.

[0005]

[Problems to be Solved by the Invention]

It is, therefore, one object of the present invention to provide a connector with which both power and control signals can be transferred, and for which the number of terminals can be reduced.

[0006]

It is another object of the present invention to facilitate the positioning of a connector when it is to be mounted on a circuit board, and to improve mechanical strength.

[0007]

It is an additional object of the present invention to eliminate the need for complicated wiring on a circuit board, particularly in the vicinity of a connector.

[0008]

[Summary of the Invention]

To achieve the above objects, according to a first aspect of the present invention, a circuit board connector mounted on a circuit board comprises: a plurality of surface mount terminals respectively provided for connection to a plurality of terminals mounted on the surface of the circuit board; and at least one pin through hole terminal protruding outward from a contact surface between the circuit board and the connector, so as to connect the pin through hole terminal to a power line through on which power is supplied to the circuit board.

[0009]

According to a second aspect of the present invention, a double mount circuit board, including a connector, comprises: a plurality of first terminals, on both surfaces of which are provided a plurality of lines, including at least one power line through on which power is supplied to the circuit board, and a second terminal, which is connected to at least one power line and which has a through hole passing through both surfaces of the circuit board; wherein the connector includes a plurality of surface mount terminals, for connection to the first terminals of the circuit board,

and at least one pin through hole terminal having a protrusion extending outward from a surface that contacts the circuit board, and wherein the protrusion of the pin through hole terminal of the connector is so fitted into a through hole in the second terminal of the circuit board that the pin through hole terminal is electrically connected to the power line on both surfaces of the circuit board.

[0010]

[Preferred Embodiment]

Fig. 2 is a perspective view of a circuit board connector according to one embodiment of the present invention. A plurality of surface mount terminals 2 and a pin through hole terminal 3 are formed on a housing 1. The surface mount terminals 2 are used for connections with control signal terminals formed on the surface of the circuit board, and are formed horizontal to the bottom surface of the housing 1. The pin through hole terminal 3 is used for a connection with a power line through which power is supplied to the circuit board, and protrudes outward from the bottom surface of the housing 1, i.e., the surface that contacts the circuit board. The height of the protruding portion of

the pin through hole terminal 3 is greater than the thickness of the circuit board to which it is to be attached.

[0011]

Slots 4 and holes 5 are formed in the upper surface of the housing 1, and protrusions on a connector having an adequate shape can be fitted therein. In the slots 4 are contact portions 6 in a number equivalent to the number of surface mount terminals 2. The power supplied to the pin through hole terminals 3 is supplied to the connector through the holes 5.

[0012]

Figs. 3(a) and 3(b) are a perspective view and a side view of the state where a pair of connectors are fitted to the housing 1. In this embodiment, a pair of connectors are separately mounted on circuit boards, and by connecting them together an electrical connection is effected between the circuit boards. If one connector is formed on a flexible cable, the circuit board and the flexible cable can be connected together.

[0013]

Fig. 4 is a schematic diagram illustrating the state where one of the above circuit board connectors is mounted on a double mount circuit board. Fig. 4(a) is a top perspective view of the installation state, and Fig. 4(b) is a bottom perspective view. A power line, through which power for driving a circuit is supplied, and multiple control signal lines, for controlling circuits, are arranged on both surfaces of a double mount circuit board 11. While multiple lines are arranged on the actual circuit board, the power line and the control signal lines are not shown so as to avoid complicating the drawings. A plurality of plane terminals 14 are formed on a surface 11a of the circuit board 11 to which a connector 12 is attached, and are to be electrically connected to a plurality of surface mount terminals 2 on the connector 12. The plane terminals 14 are connected to control signal lines.

[0014]

Six power terminals 13 having through holes are formed on the circuit board 11. The power terminals 13 are exposed at substantially the same positions on an obverse surface 11a

and a reverse surface 11b, and are connected to power lines that lie on the individual surfaces. When the pin through hole terminals 3 of the connector 12 are fitted into the through holes, the power terminals 13 on both surfaces of the circuit board 11 are connected together electrically. If one power source is applied to each pin through hole terminal 3, the connector can send six power signals to another circuit board.

[0015]

As is described above, a surface mount terminal is employed for normal signal transmission, and a power terminal is employed as a pin through hole terminal, so that adequate space can be obtained on the reverse surface of the connector relative to the required number of pin through hole terminals. Furthermore, since the diameter of each required pin through hole terminal can be made large enough to supply a large current, unlike in the conventional case, a plurality of parallel plane surface mount terminals need not be employed for the supply of power. Thus, in contrast to the conventional technique, the number of terminals can be reduced, and a savings in space can be realized at the

design stage. In addition, a complicated arrangement of lines on a circuit board, particularly in the vicinity of the connector, can be avoided.

[0016]

Since currently a technique using infrared reflow has been established for soldering pin through hole terminals, the same processing can be performed as is performed for surface mount terminals. As a result, productivity can be increased.

[0017]

Furthermore, since pin through hole terminals are placed at four corners and pass through holes in a circuit board, they can be employed as a reference for positioning the components of a surface mount connector having a small pitch. In addition, since the pin through hole terminals are soldered through the circuit board, superior mechanical strength is provided relative to insertion and removal.

[0018]

[Advantages of the Invention]

As is described above, according to the present invention, it is possible to provide a circuit board connector for which the number of terminals is reduced and the positioning of a connector on a circuit board is facilitated, and that when mounted possesses superior mechanical strength.

3. Brief Description of the Drawings:

Fig. 1 is a perspective view of a conventional connector having a surface mount terminal.

Fig. 2 is a perspective view of a circuit board connector according to the present invention.

Fig. 3 is a perspective view and a side view of the state where a pair of connectors are inserted.

Fig. 4 is a schematic diagram showing the state where the circuit board connector of the present invention is mounted on both surfaces of a double mount circuit board.



4 . Claims:

Claim 1

A circuit board connector mounted on a circuit board comprising:

a plurality of surface mount terminals respectively provided for connection to a plurality of terminals mounted on the surface of said circuit board; and

at least one pin through hole terminal protruding outward from a contact surface between said circuit board and said connector, so as to connect said pin through hole terminal to a power line through on which power is supplied to said circuit board.

Claim 2

A double mount circuit board, including a connector, comprising:

a plurality of first terminals, on both surfaces of which



are provided a plurality of lines, including at least one power line through on which power is supplied to said circuit board, and

a second terminal, which is connected to at least one power line and which has a through hole passing through both surfaces of said circuit board;

wherein said connector includes a plurality of surface mount terminals, for connection to said first terminals of said circuit board, and at least one pin through hole terminal having a protrusion extending outward from a surface that contacts said circuit board, and wherein said protrusion of said pin through hole terminal of said connector is so fitted into a through hole in said second terminal of said circuit board that said pin through hole terminal is electrically connected to said power line on both surfaces of said circuit board.