COORDINATE INPUT DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to electrostatic-capacitance-type coordinate input devices, which are operated with a user's finger and so on, and in which the coordinate position of a touched portion is detected based on a current variation according to a variation in electrostatic capacitance and the coordinate position of the touched portion is input.

[0003] 2. Description of the Related Art

[0004] In recent years, notebook computers have been widely used for space-saving in offices and homes. In this type of computer, a pad-type coordinate input device operated by dragging a finger on a touch board has been widely adopted and put into practical use as a coordinate input device for moving a cursor displayed on a display.

[0005] **FIG. 7** is a perspective view showing the configuration of a critical portion of a coordinate input device **100**.

[0006] The coordinate input device **100** shown in **FIG. 7** includes a planar touch board **101** provided at the top, a film substrate **106** comprising a dielectric thin film such as a resin film provided on the lower surface of the touch board **101**, and a circuit board **107** provided on the lower surface of the film substrate **106**. The film substrate **106** is a dielectric substrate. The upper surface of the film substrate **106** is provided with a plurality of X-electrodes **106***a* at predetermined intervals and the rear surface thereof is provided with a plurality of Y-electrodes **106** at predetermined intervals. The planar touch board **101** is bonded to the upper surface of the film substrate **106** with an adhesive or the like. Also, the film substrate **106** and the circuit board **107** are bonded via a dielectric film (not shown).

[0007] In the above-described film substrate **106**, the Y-electrodes **106***b* extend in the direction orthogonal to the X-electrodes **106***a* and the electrodes **106***a* and **106***b* are arranged in a matrix in plan view, with the film substrate **106** therebetween. Also, the X-electrodes **106***a* and the Y-electrodes **106***b* are printed on the upper surface and the lower surface of the film substrate **106** respectively, with a silver paste or the like. Further, through-holes **108** are formed along one edge of the circuit board **107** and along another edge adjacent to that edge. Also, land portions electrically connected to the electrodes **106***a* and **106***b* are formed on the rear surface of the film substrate **106** at positions corresponding to first ends of the X-electrodes **106***a* and first ends of the Y-electrodes **106***b*. The land portions and the through-holes **108** of the circuit board **107** are electrically connected. That is, the X-electrodes **106***a* and the Y-electrodes **106***b* are electrically connected to a wiring pattern formed on the upper surface of the circuit board **107** via the through-holes **108**.

[0008] Further, a ground layer **109** comprising a copper foil or the like is provided at the center of the upper surface of the circuit board **107**. The ground layer **109** helps to prevent a signal generated in the lower part of the circuit board **107** from disturbing the X-electrodes **106***a* and the Y-electrodes **106***b*. Also, a control circuit chip **110** is soldered to the wiring pattern on the rear surface of the circuit board **107**. By scanning the touch board **101** with a finger so that the finger is in soft contact with the touch board **101**, a part of the electric flux lines formed between the X-electrodes **106***a* and the Y-electrodes **106***b* of the film substrate **106** is absorbed by the finger, and thus the electric flux lines to the Y-electrodes **106***b* are reduced so that electrostatic capacitance varies. The control circuit chip **110** converts the variation in the electrostatic capacitance to a variation in an electrical signal and the variation in the electrical signal is converted to a desired coordinate position, whereby the position of the finger on the touch board **101** can be detected.

[0009] The coordinate input device **100** having the above described configuration is often mounted in front of a keyboard in a notebook personal computer and can be operated without the user moving his/her hands much away from the home position of the keyboard. However, in many pad-type coordinate input devices, a flat touch board is exposed at the surface of the computer. Thus, a person who is not accustomed to operate a computer is often puzzled by the operation method and this type of coordinate input device does not have excellent ease of use.

[0010] Also, when the area of the touch board **101** is greatly reduced, the operability and ease of use of the above-described coordinate input device are reduced. Thus, it is inevitable that the touch board **101** occupies a predetermined space in the operating portion of a notebook personal computer. Therefore, it is difficult to further miniaturize the touch board in a notebook personal computer including the coordinate input device **100**. Accordingly, the inventors of the present invention have considered adding another function to the portion occupied by the coordinate input device **100** and have investigated improving the ease of use of the coordinate input device and electronic equipment including the same, and as a result, the present invention has completed.

SUMMARY OF THE INVENTION

[0011] Accordingly, it is an object of the present invention to provide an inexpensive coordinate input device which has transparency and a high light transmittance and which operates stably so that another function can be easily added to the coordinate input device.

[0012] In order to achieve the above-described object, the present invention adopts the following configuration.

[0013] The coordinate input device according to the present invention comprises: a coordinate detector including a first insulating layer which has transparency and which is formed at the top; a first electrode layer having a plurality of linear transparent electrodes formed in parallel on the lower surface of the first insulating layer; a second insulating layer which has transparency and which is formed on the lower surface of the first electrode layer; a second electrode layer having a plurality of linear transparent electrodes which are aligned in parallel and which extend in the direction orthogonal to the transparent electrodes of the first electrode layer, the second electrode layer being formed on the lower surface of the second insulating layer; and a third insulating layer which has transparency and which is formed on the lower surface of the second electrode layer, and a controller which is electrically connected to the two electrode layers of the coordinate detector so as to drive and control the electrode layers and which has a circuit for correcting electrostatic capacitance noise that disturbs the coordinate detector.