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(54) Display device and organic light emitting diode display device

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Dispositif d'affichage et dispositif d'affichage à diode électroluminescente organique

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates generally to a display device, and more particularly, to an organic light emitting diode display device.

Description of the Related Art

[0002] A display device includes a flat type and self luminescent organic light emitting diode display device.

[0003] The organic light emitting diode display device includes an organic light emitting diode emitting light of itself to display an image. When a display unit including a plurality of organic light emitting diodes is exposed to moisture and oxygen, its function may deteriorate. Therefore, a technology of sealing the display unit to prevent the moisture and oxygen from permeating from the outside is required.

[0004] The above information disclosed in this Background section is only for enhancement of understanding of the background of the present invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

[0005] EP 1109224 discloses a light-emitting device having the quality of an image high in homogeneity is provided. A printed wiring board is provided facing a substrate that has a luminous element formed thereon. A PWB side wiring on the printed wiring board is electrically connected to element side wirings by anisotropic conductive films. At this point, because a low resistant copper foil is used to form the PWB side wiring, a voltage drop of the element side wirings and a delay of a signal can be reduced. Accordingly, the homogeneity of the quality of an image is improved, and the operating speed of a driver circuit portion is enhanced.

[0006] US 2009/095521 discloses a circuit board with plated through holes that are laid out with a fine pitch and meets requirements relating to characteristics such as the thermal expansion coefficient of the circuit board.

[0007] US 2005/179374 discloses an organic electroluminescence device that includes a power line formed on the same layer as source and drain electrodes of a thin film transistor and formed on a substrate on which the TFT is formed, a first insulating layer formed on the TFT, a lower electrode that electrically connected to one of the source and drain electrodes of the TFT and disposed on the first insulating layer, a first auxiliary power line and a second auxiliary power line formed on the same layer as the lower electrode in the second insulating layer, a second insulating layer formed on an edge portion of the lower electrode and not formed on the second auxiliary power line, wherein an opening is formed that exposes a portion of the lower electrode, an organic film formed on a substrate; and an upper electrode formed on the substrate.

[0008] EP 2081180 discloses an organic light emitting display device capable of minimizing an IR drop of pixel power sources supplied to an organic light emitting display panel.

SUMMARY OF THE INVENTION

[0009] One aspect of the present invention has been made in an effort to provide a display device and an organic light emitting diode display device having an improved sealing function of a display unit.

[0010] An embodiment of the present invention provides a display device as described in claim 1.

[0011] Additional aspects of the present invention are described in dependent claims.

[0012] An example, not forming part of the present invention, provides an organic light emitting diode display device that includes a substrate; a display unit formed on the substrate and including a common power supply line and a common electrode; a sealing substrate attached to the substrate by a bonding layer which surrounds the display unit, the sealing substrate including a resin base and a carbon fiber, and the sealing substrate including a first through-hole and a second through-hole; a first pad section positioned outside of the display unit and connected with the common power supply line; a first conductive unit formed on an inner surface and an outer surface of the sealing substrate through the first through-hole and connected with the first pad section by a conductive bonding layer to supply a first signal to the common power supply line; and a second conductive unit formed on both the inner surface and the outer surface of the sealing substrate through the second through-hole and being in close contact with the common electrode to supply a second signal to the common electrode.

[0013] The second conductive unit may include a second internal layer which is in close contact with the common electrode, a second external layer positioned on the outer surface of the sealing substrate, and a second connector which extends through the second through-hole and connects the second internal layer and the second external layer with each other.

[0014] The common electrode may include a plurality of protrusions and the second internal layer may be in close contact with the protrusion. The organic light emitting diode display device may further include a plurality of spacers positioned below the common electrode, and the protrusions may be provided to correspond to the plurality of spacers.

[0015] The second internal layer may have a larger area than the display unit and the second internal layer may be formed by any one of an aluminum film, an aluminum alloy film, a copper film, and a copper alloy film.

[0016] The first conductive unit may include a first internal layer which is overlapped with the first pad section and is in contact with the conductive bonding layer, a first

external layer positioned on the outer surface of the sealing substrate, and a first connector which extends through the first through-hole and connects the first internal layer and the first external layer with each other.

[0017] The organic light emitting diode display device may further include an insulating layer formed on the inner surface and the outer surface of the sealing substrate, the side wall of the first through-hole, and the side wall of the second through-hole. The first conductive unit and the second conductive unit may be positioned on the insulating layer.

[0018] According to the embodiments of the present invention, an organic light emitting diode display device may simplify the entire structure and manufacturing process by improving a sealing function of a display unit, increasing luminance uniformity of a screen while implementing the display unit having a large area, and reducing the number of components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

FIG. 1 is a schematic cross-sectional view of an organic light emitting diode display device constructed with a first embodiment;

FIG. 2 is a plan view of a substrate in the organic light emitting diode display device shown in FIG. 1;

FIG. 3 is a plan view illustrating an inner surface of a sealing substrate in the organic light emitting diode display device shown in FIG. 1;

FIG. 4 is a plan view illustrating an outer surface of a sealing substrate in the organic light emitting diode display device shown in FIG. 1;

FIG. 5 is a cross-sectional view taken along line V-V' of FIG. 4;

FIGS. 6 to 8 are partial enlarged cross-sectional views of an organic light emitting diode display device constructed with the first embodiment;

FIG. 9 is a schematic enlarged plan view of a part of a sealing substrate in the organic light emitting diode display device shown in FIG. 1;

FIG. 10 as a modified example of FIG. 9 is an exploded perspective view illustrating a sealing substrate in the organic light emitting diode display device shown in FIG. 1;

FIG. 11 is a schematic cross-sectional view of an organic light emitting diode display device constructed with a second example, not forming part of the present invention;

FIG. 12 is a partially enlarged diagram of the organic light emitting diode display device shown in FIG. 11;

FIG. 13 is a plan view of a substrate in an organic light emitting diode display device constructed with a third embodiment;

FIG. 14 is a plan view illustrating an inner surface of a sealing substrate in the organic light emitting diode display device constructed with the third embodiment;

FIG. 15 is a plan view illustrating an outer surface of a sealing substrate in the organic light emitting diode display device constructed with the third embodiment; and

FIGS. 16A and 16B are cross-sectional views of a sealing substrate in an organic light emitting diode display device constructed with a fourth embodiment.

DETAILED DESCRIPTION

[0020] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which embodiments of the invention are shown. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the scope of the present invention.

[0021] The drawings and description are to be regarded as illustrative in nature and not restrictive. Like reference numerals designate like elements throughout the specification. Sizes and thicknesses of components shown in the drawings are arbitrarily represented for better comprehension and ease of description and therefore, the present invention is not limited to the shown examples.

[0022] It will be understood that when an element such as a layer, film, region, or substrate is referred to as being "on" another element, it can be directly on the other element or intervening elements may also be present.

[0023] FIG. 1 is a schematic cross-sectional view of an organic light emitting diode display device constructed in accordance with a first embodiment of the invention.

[0024] Referring to FIG. 1, the organic light emitting diode display device 100 includes a substrate 11, a display unit 110 formed on the substrate 11, a sealing substrate 14 fixed to the substrate 11 by bonding layers 12 and 13 surrounding the display unit 110. The substrate 11 includes a display area A10 within which the display unit 110 is positioned and a nondisplay area positioned outside of the display area A10. The nondisplay area may be partitioned into a wire and sealing area A20 and a pad area A30.

[0025] The display unit 110 includes a plurality of pixels, and an organic light emitting diode and a driving circuit unit are formed in each pixel. The organic light emitting diode includes a pixel electrode and an organic emission layer, and a common electrode 15. The common electrode 15 is a 'conductor' within the context of the invention. The driving circuit unit is constituted by at least two thin film transistors including a switching thin film

transistor and a driving thin film transistor and at least one capacitor.

[0026] Further, a gate line and a data line, and a common power supply line 16 are positioned in each pixel. The gate line transfers a scan signal and the data line transfers a data signal. The common power supply line 16 is a 'conductor' within the context of the invention and applies common voltage to the driving thin film transistor. The common power supply line 16 may be formed in parallel to the data line or may be constituted by a first common power supply line parallel to the data line and a second common power supply line parallel to the gate line.

[0027] A detailed structure of the display unit 110 will be described later; in FIG. 1, the display unit 110 with the common power supply line 16 and the common electrode 15 is schematically shown.

[0028] The bonding layers 12 and 13 include a first bonding layer 12 surrounding the display unit 110 and a second bonding layer 13 positioned outside of the first bonding layer 12. The second bonding layer 13 surrounds the first bonding layer 12. In addition, an electrically conductive bonding layer 17 is positioned between the first bonding layer 12 and the second bonding layer 13.

[0029] The first bonding layer 12 and the second bonding layer 13 do not include an electrically conductive material and may be made of an inorganic material such as glass frit or resins. A thermosetting resin, i.e., an epoxy resin, a polyurethane resin, a phenol resin, a melamine resin, and an unsaturated polyester resin may be used to form the first bonding layer 12 and the second bonding layer 13. The materials of the first bonding layer 12 and the second bonding layers are not limited to the above-mentioned examples, but all materials having a sealing function and a bonding function may be adopted. A hygroscopic filler (not shown) may be positioned between the substrate 11 and the sealing substrate 14 inside of the first bonding layer 12.

[0030] In the organic light emitting diode display device 100 of the first embodiment, the common power supply line 16 and the common electrode 15 are not connected with a flexible printed circuit (not shown) attached to the pad area A30. Instead, the common power supply line 16 is electrically connected to a first conductive unit 20 formed on the sealing substrate 14 and is applied with a first signal from the first conductive unit 20; the common electrode 15 is electrically connected to a second conductive unit 30 formed on the sealing substrate 14 and is applied with a second signal from the second conductive unit 30.

[0031] Therefore, in the organic light emitting diode display device 100 the corresponding signal may be uniformly applied to the common power supply line 16 and the common electrode 15 without forming the pad area A30 at all of upper and lower and left and right edges of the substrate 11 while the display unit 110 having the large area is implemented. As a result, it is possible to simplify the entire structure and manufacturing process of the organic light emitting diode display device 100 while luminance nonuniformity resulting from the manufacturing of the display unit 110 having the large area may be prevented.

[0032] FIG. 2 is a plan view of a substrate in the organic light emitting diode display device shown in FIG. 1.

[0033] Referring to FIGS. 1 and 2, the substrate 11 is formed in a rectangular shape having a pair of long sides and a pair of short sides and the wire and sealing area A20 is positioned outside of four edges of the display area A10. The sealing area A20 surrounds the display area A10. The first bonding layer 12, the conductive bonding layer 17, and the second bonding layer 13 are positioned in the wire and sealing area A20. In addition, the pad area A30 is positioned at any one edge of the substrate 11 outside of the wire and sealing area A20.

[0034] In FIG. 2, the pad area A30 is positioned on a lower long side of the substrate 11, but the position of the pad area A30 is not limited to the shown example.

[0035] A first pad section 18 electrically connected with the common power supply line 16 of the display unit 110 and a second pad section 19 electrically connected with the common electrode 15 of the display unit 110 are positioned in the wire and sealing area A20. The first pad section 18 and the second pad section 19 are formed in all of four wire and sealing areas A20, and the first pad section 18 and the second pad section 19 are alternately and repetitively disposed in a horizontal direction (x-axis direction of the figure) and in a vertical direction (y-axis direction of the figure) of the substrate 11.

[0036] In FIG. 2, the second pad section 19 is displayed with a dot pattern in order to discriminate the first pad section 18 and the second pad section 19 from each other. A first pad section 18 positioned on the long side L11 of the substrate 11 among the plurality of first pad sections 18 is electrically connected with a first common power supply line, and a first pad section 18 positioned on the short side S11 of the substrate 11 is electrically connected with a second common power supply line. The first pad section 18 and the second pad section 19 shown in FIG. 2 are schematized and the positions and the number thereof are not limited to the shown example.

[0037] The first pad section 18 and the second pad section 19 are formed at positions corresponding to the conductive bonding layer 17. At this time, the conductive bonding layer 17 shows electrical conductivity only in a thickness direction (z-axis direction of the figure) and does not show electrical conductivity in other directions. Therefore, even though one conductive bonding layer 17 is in contact with both the first pad section 18 and the second pad section 19, the first pad section 18 and the second pad section 19 are not short-circuited from each other.

[0038] As such when the conductive bonding layer 17 formed by a single member is provided, a bonding process of the substrate 11 and the sealing substrate 14 using the first and second bonding layers 12 and 13 and the

conductive bonding layer 17 may be simplified. Therefore, the manufacture of the organic light emitting diode display device 100 may be simplified.

[0039] In another embodiment, a conductive bonding layer having electrical conductivity in all directions may be used. In this case, the conductive bonding layer 17 may be divided into a first conductive bonding layer (not shown) positioned to correspond to the first pad section 18 and a second conductive bonding layer (not shown) corresponding to the second pad section 19. At this time, the first conductive bonding layer and the second conductive bonding layer are spaced apart from each other by a predetermined distance so as to be prevented from being short-circuited from each other.

[0040] FIGS. 3 and 4 are plan views respectively illustrating an inner surface 114 and an outer surface 014 of the sealing substrate 14 in the organic light emitting diode display device shown in FIG. 1 and FIG. 5 is a cross-sectional view taken along line V-V' of FIG. 4.

[0041] Referring to FIGS. 1 to 5, the sealing substrate 14 has a size to cover the display area A10 and four wire and sealing areas A20 of the substrate 11. Therefore, the pad area A30 of the substrate 11 is not overlapped with the sealing substrate 14 and is exposed to the outside of the sealing substrate 14.

[0042] In the sealing substrate 14, a first through-hole 25 for applying a signal of the common power supply line 16 and a second through-hole 26 for applying a signal of the common electrode 15 are formed. In addition, the first conductive unit 20 is formed throughout the inner surface of the sealing substrate 14 and the outer surfaces of the first through-hole 25 and the sealing substrate 14, and the second conductive unit 30 is formed throughout the inner surface 14 of the sealing substrate 14 and the outer surfaces of the second through-hole 26 and the sealing substrate 14. The first through-hole 25 and the second through-hole 26 are formed at positions facing the wire and sealing area A20.

[0043] The first conductive unit 20 includes a first internal layer 21 formed on the inner surface of the sealing substrate 14, a first connector 22 which is in contact with the first internal layer 21 and extends through the first through-hole 25, and a first external layer 23 which is in contact with the first connector 22 and is formed on the outer surface of the sealing substrate 14. The first external layer 23 serves as a pad section which is applied with the first signal of the common power supply line 16.

[0044] The second conductive unit 30 includes a conductor in the form of a second internal layer 31 formed on the inner surface of the sealing substrate 14, a second connector 32 which is in contact with the second internal layer 31 and extends through the second through-hole 26, and a second external layer 33 which is in contact with the second connector 32 and is formed on the outer surface of the sealing substrate 14. The second external layer 33 serves as a pad section which is applied with the second signal of the common electrode 15.

[0045] The entirety of the first conductive unit 20 and the entirety of the second conductive unit 30 may be made of an electrically conductive material, and the first conductive unit 20 and the second conductive unit 30 are disposed spaced apart from each other to be prevented from being short-circuited from each other. That is, the first internal layer 21 and the second internal layer 31 are spaced apart from each other on the inner surface of the sealing substrate 14 by a distance d1 (see FIGS. 3 and 5) and the first external layer 23 and the second external layer 33 are spaced apart from each other on the outer surface of the sealing substrate 14 by a distance d2 (see FIG. 4).

[0046] The first internal layer 21 is overlapped with the first pad section 18 of the substrate 11 and is in contact with the conductive bonding layer 17. The second internal layer 31 is overlapped with the second pad section 19 of the substrate 11 and is in contact with the conductive bonding layer 17. At this time, the second internal layer 31 extends to the center of the sealing substrate 14 to face the display unit 110, and the second internal layer 31 is overlapped with the first bonding layer 12. The second internal layer 31 may be formed by a single member, and the first internal layer 21 may be divided into plural numbers. The first internal layer 21 is positioned outside of the second internal layer 31 to be spaced apart from the second internal layer 31.

[0047] The second internal layer 31 is formed by a metallic film having low resistance and excellent moisture and oxygen interception effects. For example, the second internal layer 31 may be formed by an aluminum film an aluminum alloy film, a copper film, or a copper alloy film. Further, the second internal layer 31 may be formed by metallic foil including aluminum or copper.

[0048] The second internal layer 31 is in close contact with the first bonding layer 12 to protect the display unit 110 and prevents moisture and oxygen from permeating from the outside. The second internal layer 31 is in direct physical contact with the first bonding layer 12. Therefore, in the organic light emitting diode display device 100 of the first embodiment, the second internal layer 31 serves as a metal encapsulation which seals the display unit 110.

[0049] The first external layer 23 may be formed at three or more edges of the sealing substrate 14 and the second external layer 33 may be formed at the rest edges of the sealing substrate 14. In FIG. 4, the second external layer 33 is positioned at a part of any one long-side edge of the sealing substrate 14 and the first external layer 23 is positioned at the entirety of the rest edge of the sealing substrate 14. However, shapes of the first external layer 23 and the second external layer 33 are not limited to the shown example and may be variously modified.

[0050] An external connection terminal (not shown) is attached to the first external layer 23 and the second external layer 33. As a result, the first external layer 23 is applied with the first signal of the common power supply line 16 from the external connection terminal, and the first external layer 23 transfers the corresponding first

signal to the first internal layer 21; the second external layer 33 is applied with the second signal of the common electrode 15 from the external connection terminal, and the second external layer 33 transfers the corresponding second signal to the second internal layer 31.

[0051] The first external layer 23 is larger than the first internal layer 21 in at least one of width and thickness, and the second external layer 33 is formed thicker than the second internal layer 31. In all cases, the first internal layer 21 and the second internal layer 31 have the same thickness as each other, and the first external layer 23 and the second external layer 33 have the same thickness as each other to prevent a step from being generated in a bonding process of the substrate 11 and the sealing substrate 14. The above-mentioned structure may be usefully applied to the organic light emitting diode display device having a large current and a large area.

[0052] In the organic light emitting diode display device 100, since the substrate 11 is subjected to dozens of heat-treatment processes for forming a driving circuit unit and an organic light emitting diode thereon, glass or polymer resin having a low thermal expansion coefficient is used. The sealing substrate 14 is manufactured by a resin base and a carbon composite material including a plurality of carbon fibers. The sealing substrate 14 may have substantially the same thermal expansion coefficient as the thermal expansion coefficient of the substrate 11 by adjusting the amount of a carbon fiber and the amount of the resin base.

[0053] Therefore, when the substrate 11 and the sealing substrate 14 are bonded to each other by curing the first and second bonding layers 12 and 13 and the conductive bonding layer 17 at high temperature, the sealing substrate 14 is not bent because the substrate 11 has the same thermal expansion coefficient as the sealing substrate 14; after the substrate 11 and the sealing substrate 14 are bonded to each other, a bending problem does not occur in an environmental reliability test.

[0054] Meanwhile, the sealing substrate 14 manufactured by carbon composites has electrical conductivity. When the first conductive unit 20 and the second conductive unit 30 are directly formed on the surface of the sealing substrate 14, the first conductive unit 20 and the second conductive unit 30 are short-circuited from each other through the sealing substrate 14. Therefore, as shown in FIG. 5, an electrically insulating layer 41 is formed on the inner surface and the outer surface of the sealing substrate 14, the side wall of the first through-hole 25, and the side wall of the second through-hole 26 are formed to prevent the first conductive unit 20 and the second conductive unit 30 from being short-circuited from each other.

[0055] A detailed structure and constituent materials of the sealing substrate 14 will be described later. FIGS. 6 to 8 are partially enlarged cross-sectional views of an organic light emitting diode display device constructed with the first embodiment.

[0056] In FIG. 6, the first common power supply line and the first pad section are shown in detail; in FIG. 7, the second common power supply line and the first pad section are shown in detail. The first common power supply line crosses the second common power supply line. The first common power supply line and the second common power supply line may be respectively disposed in different layers. In addition, in FIG. 8, the common electrode and the second pad section are shown in detail.

[0057] Referring to FIGS. 6 to 8, the organic light emitting diode 60 and the driving circuit unit are formed in each pixel of the display unit as described above. The driving circuit unit is constituted by at least two thin film transistors and at least one capacitor. In FIGS. 6 to 8, it is schematically shown that one thin film transistor 50 and the one organic light emitting diode 60 are positioned in the display unit.

[0058] The thin film transistor 50 includes a semiconductor layer 51, a gate electrode 52, a source electrode 53, and a drain electrode 54. The semiconductor layer 51 is formed by a polycrystalline silicon film and includes a channel domain 511, a source domain 512, and a drain domain 513. The channel domain 511 is an intrinsic semiconductor undoped with impurities, and the source domain 512 and the drain domain 513 are impurity semiconductors doped with the impurities.

[0059] The gate electrode 52 is positioned on the channel domain 511 of the semiconductor layer 51 with a gate insulating layer 43 interposed therebetween. The source electrode 53 and the drain electrode 54 are positioned on the gate electrode 52 with an interlayer insulating layer 44 interposed therebetween and connected to the source domain 512 and the drain domain 513 through a contact hole formed on the interlayer insulating layer 44, respectively. A planarization layer 45 is formed on the source electrode 53 and the drain electrode 54 and a pixel electrode 61 is positioned on the planarization layer 45. The pixel electrode 61 is connected with the drain electrode 54 through a contact hole of the planarization layer 45.

[0060] A pixel defined layer 46 is positioned above the pixel electrode 61 and the planarization layer 45. The pixel defined layer 46 exposes a part of the pixel electrode 61 by forming a first opening 461 in each pixel. An organic emission layer 62 is formed above the exposed pixel electrode 61 and the common electrode 15 is formed in the entirety of the display area A10 to cover the organic emission layer 62 and the pixel defined layer 46. The pixel electrode 61, the organic emission layer 62, and the common electrode 15 constitute the organic light emitting diode 60.

[0061] The pixel electrode 61 may be a hole injection electrode and the common electrode 15 may be an electron injection electrode. In this case, the organic emission layer 62 includes a hole injection layer, a hole transporting layer, a light emitting layer, an electron transporting layer, and an electron injection layer that are sequentially laminated from the pixel electrode 61. Holes and electrons are injected into the organic emission layer 62 from the pixel electrode 61 and the common electrode 15 and

when excitons formed by combining the injected holes and electrons with each other fall from an excited state to a ground state, light is emitted.

[0062] The pixel electrode 61 is formed by a transmissive conductive layer, and the common electrode 15 is formed by a reflective conductive layer. Light emitted from the organic emission layer 62 is reflected by the common electrode 15 and discharged to the outside through the substrate 11. Such an emission structure is called a bottom emission type. The pixel electrode 61 may be formed by triple layers of ITO, silver (Ag), and ITO and the common electrode 15 may include any one of silver (Ag), aluminum (Al), a silver alloy, and an aluminum alloy.

[0063] A first common power supply line 161 and a second common power supply line 162 may be formed on the same layer as any one electrode of the gate electrode 52, and the source and drain electrodes 53 and 54. In FIG. 6, the first common power supply line 161 may be formed on the same layer as and made of the same material as the source and drain electrodes 53 and 54; in FIG. 7, the second common power supply line 162 may be formed on the same layer as and made of the same material as the gate electrode 52.

[0064] Referring to FIGS. 6 and 7, the ends of the first common power supply line 161 and the second common power supply line 162 extend to the wire and sealing area A20. In addition, at least one insulating layer among four insulating layers formed in the display unit extends to the wire and sealing area A20. The end of the first common power supply line 161 is covered with the planarization layer 45 and the end of the second common power supply line 162 is covered with the interlayer insulating layer 44 and the planarization layer 45.

[0065] The planarization layer 45 exposes the end of the first common power supply line 161 by forming a second opening 451 and a first pad conductive layer 47 is formed on the planarization layer 45 to be electrically connected with the first common power supply line 161 through the second opening 451. The first pad section 18 positioned on the long side of the substrate 11 may be defined by the first pad conductive layer 47.

[0066] The interlayer insulating layer 44 and the planarization layer 45 expose the end of the second common power supply line 162 by forming a third opening 48 and a second pad conductive layer 49 is formed on the planarization layer 45 to be electrically connected with the second common power supply line 162 through the third opening 48. The first pad section 18 positioned on the short side of the substrate 11 may be defined by the second pad conductive layer 49.

[0067] The first pad conductive layer 47 of FIG. 6 and the second pad conductive layer 49 of FIG. 7 may be formed on the same layer as and made of the same material as the pixel electrode 61. Therefore, since an additional patterning process for forming the first and second pad conductive layers 47 and 49 may be omitted, it is possible to simplify a manufacturing process.

[0068] Referring to FIG. 8, the common electrode 15 is positioned inside of the first bonding layer 12 and the second pad section 19 is formed both inside and outside of the first bonding layer 12 to conduct the common electrode 15 and the conductive bonding layer 17.

[0069] The second pad section 19 includes a third pad conductive layer 70, a fourth pad conductive layer 71, and a fifth pad conductive layer 72. The third pad conductive layer 70 is positioned inside of the first bonding layer 12 and is in contact with the common electrode 15. The fourth pad conductive layer 71 is connected to the third pad conductive layer 70 through a fourth opening 452 of the planarization layer 45 and positioned both inside and outside of the first bonding layer 12. The fifth pad conductive layer 72 is positioned between the conductive bonding layer 17 and the planarization layer 45, and the fifth pad conductive layer 72 is connected with the fourth pad conductive layer 71 through a fifth opening 453 of the planarization layer 45.

[0070] The third pad conductive layer 70 and the fifth pad conductive layer 72 are formed on the same layer as and made of the same material as the pixel electrode 61. In addition, the fourth pad conductive layer 71 is formed on the same layer as and made of the same material as any one electrode of the gate electrode 52 and the source and drain electrodes 53 and 54. Therefore, since an additional patterning process for forming the second pad section 19 may be omitted, it is possible to simplify the manufacturing process.

[0071] In FIG. 8, the fourth pad conductive layer 71 is formed on the same layer as the source and drain electrodes 53 and 54 as an example. However, a detailed structure of the second pad section 19 is not limited to the shown example and all configurations capable of conducting the common electrode 15 of the display unit and the conductive bonding layer 17 of the wire and sealing area are applicable.

[0072] In the organic light emitting diode display device 100, the substrate 11 may be manufactured by transparent glass or transparent plastic having a low thermal expansion coefficient. The substrate 11 made of the transparent plastic may include any one of polyethersulfone, polyacrylate, polyetherimide, polyethylene, naphthalate, polyethylene terephtharate, polyphenylen sulfide, polyarylate, polyimide, polycarbonate, cellulose tri acetate, and cellulose acetate propionate.

[0073] A plurality of processes for forming a plurality of pixels on the substrate 11 are performed and since heat is applied during the processes, the substrate 11 is expanded by heat. Since the expansion of the substrate 11 reduces the durability of the organic light emitting diode display device 100 and the accuracy of the display area A10, a material having a low thermal expansion coefficient is selected at the time of selecting the material of the substrate 11. The substrate 11 made of the glass or plastic have thermal expansion coefficients in the range of approximately 3×10^{-6}/K to 4×10^{-6}/K.

[0074] FIG. 9 is a schematic enlarged plan view of a

part of a sealing substrate in the organic light emitting diode display device shown in FIG. 1.

[0075] Referring to FIG. 9, the sealing substrate 14 is manufactured by a carbon composite material including a resin base 73 and a plurality of carbon fibers 74. The sealing substrate 14 may be formed by impregnating the plurality of carbon fiber 74 in the resin base 73.

[0076] The carbon fiber 74 has a lower thermal expansion coefficient than the substrate 11. In particular, the longitudinal thermal expansion coefficient of the carbon fiber 74 has a minus value. In contrast, the resin base 73 has a higher thermal expansion coefficient than the substrate 11. Therefore, it is possible to the thermal expansion coefficient of the sealing substrate 14 by adjusting the quantity of the carbon fiber 74 and the quantity of the resin base 73.

[0077] That is, when the sealing substrate 14 is manufactured by mixing the carbon fiber 74 and the resin base 73 with each other, the thermal expansion coefficient of the sealing substrate 14 and the thermal expansion coefficient of the substrate 11 may be controlled to be the same as or similar to each other by adjusting a ratio between the resin base 73 and the carbon fiber 74.

[0078] Since the carbon fiber 74 does not absorb moisture, the carbon fiber 74 improves the moisture permeation preventing performance of the sealing substrate 14. Further, since the sealing substrate 14 including the carbon fiber 74 has an excellent mechanical property, large mechanical rigidity may be implemented with small thickness. Therefore, it is possible to reduce the entire thickness of the organic light emitting diode display device 100. Further, the sealing substrate 14 serves to suppress the thermal expansion of the first internal layer 21 and the second internal layer 31.

[0079] The plurality of carbon fibers 74 cross each other, and for example, the carbon fibers 74 may have a pattern weaved by being tied with a longitudinal line and a latitudinal line. In FIG. 9, the carbon fibers 74 are perpendicular to each other, but the present invention is not limited thereto and the carbon fibers 74 may cross each other at angles other than the right angle. By the abovementioned configuration, the sealing substrate 14 having a uniform and low thermal expansion coefficient may be formed in the entire area and the durability of the sealing substrate 14 may be improved.

[0080] FIG. 10 as a modified example of FIG. 9 is an exploded perspective view illustrating a sealing substrate 140 according to the present invention in the organic light emitting diode display device shown in FIG. 1.

[0081] Referring to FIG. 10, the sealing substrate 140 is constituted by a plurality of layers. For example, the sealing substrate 140 may be configured in a lamination structure of a first layer 141, a second layer 142, a third layer 143, and a fourth layer 144. The layers 141, 142, 143, and 144 include the resin base 73 and the plurality of carbon fibers 741, 742, 743, and 744.

[0082] The carbon fibers 741 and 744 of the first layer 141 and the fourth layer 144 are arranged in a first direction and the carbon fibers 742 and 743 of the second layer 142 and the third layer 143 are arranged in a second direction. The first direction and the second direction are perpendicular to each other but they need not be. In FIG. 10, the first direction and the second direction are perpendicular to each other as an example. When the plurality of carbon fibers 741, 742, 743, and 744 are arranged as above, it is possible to improve the flatness of the sealing substrate 140 by preventing the sealing substrate 140 from being twisted.

[0083] In order to adjust the thermal expansion coefficient of the sealing substrate 140, an angle between the arrangement direction of the carbon fibers 741 and 744 provided on the first layer 141 and the fourth layer 144 and the arrangement direction of the carbon fibers 742 and 743 provided on the second layer 142 and the third layer 143 may be variously set. Of course, it is possible to easily adjust the thermal expansion coefficient of each of the layers 141, 142, 143, and 144 by adjusting the quantities of the resin base 73 and the carbon fibers 741, 742, 743, and 744 included in the layers 141, 142, 143, and 144.

[0084] FIG. 11 is a schematic cross-sectional view of an organic light emitting diode display device constructed in accordance with a second example, not according to the present invention, and FIG. 12 is a partially enlarged diagram of the organic light emitting diode display device shown in FIG. 11.

[0085] Referring to FIGS. 11 and 12, the organic light emitting diode display device 200 has a similar configuration to the organic light emitting diode display device of the first embodiment except for a configuration in which the second pad section is omitted and the second internal layer 31 formed on the sealing substrate 14 is in contact with the common electrode 150. The same members as the first embodiment refer to the same reference numerals.

[0086] In the display unit 110, the common electrode 150 has an uneven structure, that is, a plurality of protrusions 151 and the protrusions 151 are in close contact with the second internal layer 31 formed on the sealing substrate 14. Therefore, the common electrode 150 is directly connected with the second conductive unit 30 without passing through the conductive bonding layer to be applied with the second signal therefrom.

[0087] The uneven structure of the common electrode 150 is implemented by a plurality of spacers 75 formed on the pixel defined layer 46 and the common electrode 150 is formed in the entirety of the display area A10 while covering the plurality of spacers 75. The common electrode 150 is in close contact with the second internal layer 31 to be electrically connected with the second conductive unit 30 when the substrate 11 and the sealing substrate 14 are bonded to each other under a pressing condition.

[0088] FIG. 13 is a plan view of a substrate in an organic light emitting diode display device constructed in accordance with a third embodiment of the invention and FIGS.

14 and 15 are plan views illustrating an inner surface and an outer surface of a sealing substrate in the organic light emitting diode display device, respectively.

[0089] Referring to FIG. 13, in the organic light emitting diode display device 300 of the third embodiment, the first common power supply line is divided into a first odd number-th common power supply line and a first even number-th common power supply line, and the second common power supply line is divided into a second odd number-th common power supply line and a second even number-th common power supply line. The first odd number-th common power supply line and the second odd number-th common power supply line are applied with a third signal and the first even number-th common power supply line and the second even number-th common power supply line are applied with a fourth signal. Such a structure is in use for driving interlace scanning.

[0090] The first pad section for the common power supply line formed on the substrate 11 includes a third pad section 76 for the first odd number-th common power supply line and the second odd number-th common power supply line and a fourth pad section 77 for the first even number-th common power supply line and the second even number-th common power supply line. The third pad section 76 and the fourth pad section 77 are alternately and repetitively disposed in a horizontal direction and a vertical direction of the substrate 11. In addition, the second pad section 19 for the common electrode is positioned between the third pad section 76 and the fourth pad section 77 in four wire and sealing areas A20.

[0091] In FIG. 13, the second pad section 19 is shown in a circular shape in order to discriminate the second pad section 19 from the third pad section 76 and the fourth pad section 77 and the fourth pad section 77 is shown as a dot pattern. The second pad section 19 and the third pad section 76 and the fourth pad section 77 shown in FIG. 13 are schematized and the positions and the number thereof are not limited to the shown example.

[0092] Referring to FIGS. 14 and 15, the first conductive unit includes a third conductive unit 80 for the first odd number-th common power supply line and the second odd number-th common power supply line and a fourth conductive unit 90 for the first even number-th common power supply line and the second even number-th common power supply line. The sealing substrate 14 includes a third through-hole for the third conductive unit 80 and a fourth through-hole for the fourth conductive unit 90.

[0093] The third conductive unit 80 includes a third internal layer 81 formed on the inner surface of the sealing substrate 14, a third connector 82 which is in contact with the third internal layer 81 and extends through the third through-hole, and a third external layer 83 which is in contact with the third connector 82 and is formed on the outer surface of the sealing substrate 14. The fourth conductive unit 90 includes a fourth internal layer 91 formed on the inner surface of the sealing substrate 14, a fourth connector 92 which is in contact with the fourth internal layer 91 and extends through the fourth through-hole, and a fourth external layer 93 which is in contact with the fourth connector 92 and is formed on the outer surface of the sealing substrate 14.

[0094] The second internal layer 31, the third internal layer 81, and the fourth internal layer 91 are spaced apart from each other by a predetermined distance on the inner surface of the sealing substrate 14. The second external layer 33, the third external layer 83, and the fourth external layer 93 are spaced apart from each other by a predetermined distance on the outer surface of the sealing substrate 14.

[0095] The second internal layer 31 is overlapped with the second pad section 19 of the substrate 11 and is in contact with the conductive bonding layer 17. The third internal layer 81 is overlapped with the third pad section 76 of the substrate 11 and is in contact with the conductive bonding layer 17. The fourth internal layer 91 is overlapped with the fourth pad section 77 of the substrate 11 and is in contact with the conductive bonding layer 17. At this time, the second internal layer 31 extends to the center of the sealing substrate 14 to face the display unit 110 and may be overlapped with the first bonding layer 12.

[0096] The third internal layer 81 and the fourth internal layer 91 are positioned outside of the second internal layer 31 and any one of the third internal layer 81 and the fourth internal layer 91, for example, the third internal layer 81 may be positioned at four edges of the sealing substrate 14. In this case, the fourth internal layer 91 are divided into plural numbers between the second internal layer 31 and the third internal layer 81.

[0097] The third external layer 83 is positioned at fourth edges of the sealing substrate 14, the fourth external layer 93 is positioned in parallel to the third external layer 83, and the fourth external layer 93 is surrounded by the third external layer 83. The third external layer 83 and the fourth external layer 93 have a quadrangular frame shape, and the second external layer 33 are divided into plural numbers between the third external layer 83 and the fourth external layer 93.

[0098] The third external layer 83 is thicker than the third internal layer 81, and the fourth external layer 93 is thicker and wider than the fourth internal layer 91 to be usefully applied to the large-sized organic light emitting diode display device having large current capacity.

[0099] In the above-mentioned third embodiment, the third conducive unit 80 may be the fourth conductive unit 90 and the fourth conductive unit 90 may be the third conductive unit 80. That is, the third conductive unit 80 having the above-mentioned configuration may be a conductive unit for the first even number-th common power supply line and the second even number-th common power supply line, and the fourth conductive unit 90 having the above-mentioned configuration may be a conductive unit for the first odd number-th common power supply line and the second odd number-th common power sup-

ply line.

[0100] The organic light emitting diode display device 300 of the third embodiment has a similar configuration as the organic light emitting diode display device of the first embodiment except for the above-mentioned configuration.

[0101] FIGS. 16A and 16B are cross-sectional views of a sealing substrate in an organic light emitting diode display device according to a fourth embodiment of the invention. FIGS. 16A and 16bB show cross sections acquired by cutting the same sealing substrate at different positions.

[0102] Referring to FIGS. 16A and 16B, the organic light emitting diode display device constructed in accordance with the fourth embodiment has a configuration similar to any one of the first or third embodiments described above except that a plurality of wire layers 35 are positioned in the sealing substrate 140 and a plurality of electronic elements 36 are mounted on the outer surface of the sealing substrate 140. In FIGS. 16A and 16B, only the sealing substrate 140 is shown for convenience and a detailed description of duplicate contents with the embodiments will be omitted.

[0103] In the organic light emitting diode display device of the fourth embodiment, the sealing substrate 140 are configured by a plurality of layers and each of the layers is surrounded by the insulating layer 41. Although a case in which the sealing substrate 140 includes the first layer 141 and the second layer 142 is shown as an example in FIGS. 16A and 16B, the number of the layers constituting the sealing substrate 140 is not limited to the shown example. Each of the first layer 141 and the second layer 142 may include a resin base and a plurality of carbon fibers, and the carbon fibers of the first layer 141 and the carbon fibers of the second layer 142 may cross each other.

[0104] The plurality of electronic elements 36 are mounted on the outer surface of the first layer 141 positioned furthest from the display unit (see reference numeral 110 in FIG. 1). At least two electronic elements of the plurality of electronic elements 36 share one wire layer 35 by a fifth connector 37 penetrating the first layer 141 and are thus connected through the wire layer 35. In addition, at least one electronic element of the plurality of electronic elements 36 is connected with metallic films 391, 392, and 393 corresponding thereto by a sixth connector 38 penetrating the first layer 141 and the second layer 142.

[0105] In FIGS. 16A and 16B, four electronic elements 36 are shown as an example. The electronic elements may be an embedded signal unit 361, an integrated circuit 362, passive components 363 such as a capacitor and a resistor, and a power signal unit 364. The integrated circuit 362 is connected with each of the embedded signal unit 361, the passive components 363, and the power signal unit 364, and the passive components 363 may be connected with the power signal unit 364.

[0106] In FIGS. 16A and 16B, a first wire layer 351 connecting the embedded signal unit 361 and the integrated circuit 362, a second wire layer 352 connecting the passive components 363 and the power signal unit 364, and a third wire layer 353 connecting the integrated circuit 362 and the passive components 363 are shown as an example.

[0107] The passive components 363 are used to generate voltages required to operate the integrated circuit 362 and the integrated circuit 362 may include a level shifter that shifts an embedded signal to a voltage level suitable for driving the display unit. The embedded signal unit 361, the power signal unit 364, and the integrated circuit 362 may be connected to the metallic films 391, 392, and 393 corresponding thereto, respectively.

[0108] A driving signal of the embedded signal unit 361, a power voltage of the power signal unit 364, and the signal shifted by the integrated circuit 362 are applied to the display unit through the corresponding metallic films 391, 392, and 393, and a conductive bonding layer (not shown). In this case, pad sections (not show) corresponding to the embedded signal unit 361, the power signal unit 364, and the integrated circuit 362, respectively are formed in parts on the outer surface of the display unit connected with the conductive bonding layer (not shown).

[0109] Types of the electronic elements 36 and the position of the wire layer 35 are not limited to the above-mentioned example and may be changed variously. For example, all the electronic elements required to drive the display unit may be mounted on the sealing substrate 140. In this case, the sealing substrate 140 may substitute for a flexible printed circuit (FPC) and a printed circuit board (PCB) in the related art.

[0110] While this disclosure has been described in connection with what is presently considered to be practical embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

Claims

1. A display device (100), comprising:

a substrate (11);
a display part (110) disposed on the substrate (11);
a sealing substrate (14; 140) bonded to the substrate (11) by a bonding layer (12, 13) which surrounds the display part (110);
wherein the sealing substrate (14; 140) is constituted by a plurality of layers (141-144), wherein each of the plurality of layers is electrically conductive and comprises a resin base (73) and a plurality of carbon fibers (74, 741-744), wherein each of the plurality of layers (141 to 144) is

surrounded by an insulating layer (41) and includes a first through-hole (25), and wherein wire layers (35) are positioned among the plurality of layers (141 to 144);
at least one conductor located between the substrate (11) and the sealing substrate (14; 140);
a first electrically conductive unit including a first connector (22, 38) extending through each first through-hole (25) and contacting at least one of the said at least one conductors;
wherein the insulating layer (41) is disposed on the inner surface (114) and outer surface (014) of each of the plurality of layers (141 to 144) and a side wall of each first through-hole (25);
wherein the display part (110) comprises a plurality of pixels, each comprising an organic light emitting diode (60) and a driving circuit unit, wherein the organic light emitting diode (60) includes a pixel electrode (61), and organic emission layer (62) and a common electrode (15; 150) and wherein the driving circuit unit included a driving thin film transistor;
wherein the said at least one conductor comprises a common power supply line (16) configured to apply a common voltage to the thin film transistors, and the common electrode (15; 150);
each of the plurality of layers (141 to 144) of the sealing substrate (14; 140) comprises a second through-hole (26);
the first electrically conductive unit is formed on an inner surface (114) and an outer surface (014) of the sealing substrate (14; 140) and the first connector (22) extends through the said first through-hole (25) of each of the plurality of layers (141 to 144) for supplying a first signal to the common power supply line (16);
a second electrically conductive unit including a second connector (32, 38) is formed on both the inner surface (114) and the outer surface (014) of the sealing substrate (14; 140) and the second connector (32, 38) extends through the second through-hole (26) of each of the plurality of layers (141 to 144) for supplying a second signal to the common electrode (15; 150);
a pad section positioned outside of the display part (110), the pad section comprising a first pad section (18) which is connected with the common power supply line (16) and a second pad section (19) which is connected with the common electrode (15; 150); and
an electrically conductive bonding layer (17) positioned between the first pad section (18) and the first electrically conductive unit and between the second pad section (19) and the second electrically conductive unit, the electrically conductive bonding layer (17) electrically connecting the first pad section (18) to the first electrically conductive unit and electrically connecting the second pad section (19) to the second electrically conductive unit,
wherein the first pad section (18) and the second pad section (19) are alternately and repetitively disposed in one direction of the substrate (11).

2. A display device (100) according claim 1, wherein:
the plurality of carbon fibers (74, 741-744) cross each other in the resin base (73).

3. A display device (100) according claim 1 or 2, wherein:
the carbon fibers (74, 741-744) disposed on at least one layer of the plurality of layers (141 to 144) and the carbon fibers (74, 741-744) disposed on another layer of the plurality of layers (141 to 144) cross each other.

4. A display device according to any preceding claim, wherein:

the first electrically conductive unit includes a plurality of metallic films (391, 392, 393) which are spaced apart from each other and positioned on one surface of the sealing substrate (14; 140) facing the substrate (11),
the first electrically conductive unit includes a plurality of connectors (37, 38) corresponding to the plurality of metallic films (391, 392, 393), respectively, and
each metallic film (391, 392, 393) is adapted to be supplied with an independent signal through each corresponding connector.

5. A display device (100) according claim 4, wherein:
the plurality of metallic films (391, 392, 393) and the plurality of connectors (22, 32, 82, 92, 37, 38) are positioned on the insulating layer (41).

6. A display device (100) according to claim 4 or 5, wherein:
a plurality of electronic elements (36) are mounted on an outer surface (014) of a layer which is disposed furthest from the display part (110) among the plurality of layers (141 to 144).

7. A display device (100) according to claim 6, wherein:
at least two electronic elements (36) of the plurality of electronic elements (36) are electrically connected to each other through the wire layers (35), and at least one electronic element (36) is electrically connected with one of the metallic films (391, 392, 393) through one of the plurality of connectors (22, 32, 82, 92, 37, 38).

8. A display device (100) according to claim 1, wherein:

the insulating layer (41) is formed on the inner surface (114) and the outer surface (014) of each of the plurality of layers (141 to 144) of the sealing substrate (14; 140), the side wall of the said first through-hole (25) of each of the plurality of layers (141 to 144), and the side wall of the second through-hole (26) of each of the plurality of layers (141 to 144),
wherein the first electrically conductive unit and the second electrically conductive unit are disposed on the insulating layer (41).

9. A display device (100) according to claim 8, wherein:

the second electrically conductive unit includes a second internal layer (31) which is in contact with the bonding layer (12; 13) on the inner surface (114) of the sealing substrate (14; 140) facing the display part (110) and faces the display part (110), and
the first electrically conductive unit includes a first internal layer (21);
wherein the first internal layer (21) and the second internal layer (31) are formed on the inner surface (114) of the sealing substrate (14; 140) facing the display part (110) and are spaced apart from each other on the inner surface (114) of the sealing substrate (14; 140).

10. A display device (100) according to claim 9, wherein:
the second internal layer (31) is formed by any one of an aluminum film, an aluminum alloy film, a copper film, and a copper alloy film.

11. A display device (100) according to claim 9 or 10, wherein:

the first electrically conductive unit comprises a first external layer (23) which is positioned on the outer surface (014) of the sealing substrate (14; 140), and
the first external layer (23) is larger than the first internal layer (21) in at least one of width and thickness.

12. A display device (100) according to claim 9, 10 or 11, wherein:

the second electrically conductive unit further comprises a second external layer (33) which is positioned on the outer surface (014) of the sealing substrate (14; 140), and
the second external layer (33) is thicker than the second internal layer (31).

13. A display device (100) according to any of claims 1 to 12, wherein:
the common power supply line (16) comprises a first common power supply line (161) and a second common power supply line (162) which cross each other.

14. A display device (100) according to claim 13, wherein:

the first common power supply line (161) is divided into a first odd number-th common power supply line and a first even number-th common power supply line, and the second common power supply line (162) is divided into a second odd number-th common power supply line and a second even number-th common supply line; and
the first electrically conductive unit comprises a third electrically conductive unit which is connected with the first odd number-th common power supply line and the second odd number-th common power supply line to supply a third signal to the first common power supply line (161) and the second common power supply line (162), and a fourth electrically conductive unit which is connected with the first even number-th common power supply line and the second even number-th common power supply line to supply a fourth signal to the first common power supply line (161) and the second common power supply line (162).

15. A display device (100) according to one of claims 1 to 14, wherein:
the conductive bonding layer (17) shows an electrical conductivity in a thickness direction, shows an electrical insulativity in directions other than the thickness direction, and is overlapped with the first pad section (18) and the second pad section (19).

16. A display device of claim 15, wherein:

the first electrically conductive unit comprises a first internal layer (21) which is overlapped with the first pad section (18) and is in contact with the conductive bonding layer (17), and a first external layer (23) positioned on the outer surface (014) of the sealing substrate (14; 140) and
the second electrically conductive unit comprises a second internal layer (31) which is overlapped with the second pad section (19) and is in contact with the conductive bonding layer (17), and a second external layer (33) positioned on the outer surface (014) of the sealing substrate (14; 140).

17. A display device (100) according to claim 16, wherein:

the second internal layer (31) extends to the center of the sealing substrate (14; 140) to face

the display part (110), and
the first internal layer (21) is disposed outside of the second internal layer (31) and is spaced apart from the second internal layer (31) by a predetermined distance.

18. A display device (100) according to claim 16 or 17, wherein:

the first external layer (23) is positioned at at least three edges of the sealing substrate (14; 140), and
the second external layer (33) is positioned at the rest edges of the sealing substrate (14; 140).

19. A display device (100) according to claim 15 when dependent upon claim 14, wherein:

the first pad section (18) comprises a third pad section (76) connected with the first odd number-th common power supply line and the second odd number-th common power supply line and a fourth pad section (77) which is connected with the first even number-th common power supply line and the second even number-th common power supply line,
the first through-holes (25) each comprise a third through-hole for passing the third electrically conductive unit and a fourth through-hole for passing the fourth electrically conductive unit.

20. A display device (100) according to claim 19, wherein:

the third electrically conductive unit comprises a third internal layer (81) which is overlapped with the third pad section (76) and is in contact with the conductive bonding layer (17), a third external layer (83) positioned on the outer surface (014) of the sealing substrate (14; 140), and a third connector (82) which connects the third internal layer (81) and the third external layer (83) with each other while extending through each third through-hole, and
the fourth electrically conductive unit comprises a fourth internal layer (91) which is overlapped with the fourth pad section (77) and is in contact with the conductive bonding layer (17), a fourth external layer (93) positioned on the outer surface (014) of the sealing substrate (14; 140), and a fourth connector (92) which connects the fourth internal layer (91) and the fourth external layer (93) with each other while extending through each fourth through-hole.

21. A display device (100) according to claim 20, wherein:

the second internal layer (31) extends to the center of the sealing substrate (14; 140) and faces the display part (110),
the third internal layer (81) and the fourth internal layer (91) are positioned outside of the second internal layer (31), and
any one of the third internal layer (81) and the fourth internal layer (91) is positioned at four edges of the sealing substrate (14; 140).

22. A display device (100) according to claim 20 or 21, wherein:

the third external layer (83) is positioned at four edges of the sealing substrate (14; 140),
the fourth external layer (93) is positioned in parallel to the third external layer (83) outside or inside of the third external layer (83), and
the second external layer (33) is positioned between the third external layer (83) and the fourth external layer (93).

Patentansprüche

1. Anzeigevorrichtung (100), umfassend:

ein Substrat (11);
ein Anzeigeteil (110), das auf dem Substrat (11) angeordnet ist;
ein Dichtungssubstrat (14; 140), das über eine Bindeschicht (12, 13), die das Anzeigeteil (110) umgibt, mit dem Substrat (11) verbunden ist;
wobei das Dichtungssubstrat (14; 140) durch eine Mehrzahl von Schichten (141-144) gebildet wird, wobei jede der Mehrzahl von Schichten elektrisch leitfähig ist und eine Harzgrundlage (73) und eine Mehrzahl von Kohlenstofffasern (74, 741-744) umfasst,
wobei jede der Mehrzahl von Schichten (141 bis 144) von einer Isolierschicht (41) umgeben ist und ein erstes Durchgangsloch (25) umfasst,
und wobei Drahtschichten (35) zwischen der Mehrzahl von Schichten (141 bis 144) angeordnet sind;
wenigstens einen Leiter, der sich zwischen dem Substrat (11) und dem Dichtungssubstrat (14; 140) befindet;
eine erste elektrisch leitfähige Einheit, die ein erstes Verbindungselement (22, 38) umfasst, das sich durch jedes erste Durchgangsloch (25) hindurch erstreckt und mit wenigstens einem der wenigstens einen Leiter in Kontakt steht;
wobei die Isolierschicht (41) auf der Innenfläche (114) und Außenfläche (O14) jeder der Mehrzahl von Schichten (141 bis 144) und einer Seitenwand jedes ersten Durchgangslochs (25) angeordnet ist;

wobei das Anzeigeteil (110) eine Mehrzahl von Pixeln umfasst, die jeweils eine organische lichtemittierende Diode (60) und eine Ansteuerschaltungseinheit umfassen, wobei die organische lichtemittierende Diode (60) eine Pixelelektrode (61) und eine organische Emissionsschicht (62) und eine gemeinsame Elektrode (15; 150) umfasst und wobei die Ansteuerschaltungseinheit einen Ansteuerungsdünnschichttransistor umfasst;
wobei der wenigstens eine Leiter eine gemeinsame Stromversorgungsleitung (16) umfasst, die dazu ausgestaltet ist, an die Dünnschichttransistoren und die gemeinsame Elektrode (15; 150) eine gemeinsame Spannung anzulegen;
jede der Mehrzahl von Schichten (141 bis 144) des Dichtungssubstrats (14; 140) ein zweites Durchgangsloch (26) umfasst;
die erste elektrisch leitfähige Einheit auf einer Innenfläche (114) und einer Außenfläche (O14) des Dichtungssubstrats (14; 140) ausgebildet ist und das erste Verbindungselement (22) sich durch das erste Durchgangsloch (25) jeder der Mehrzahl von Schichten (141 bis 144) hindurch erstreckt, um der gemeinsamen Stromversorgungsleitung (16) ein erstes Signal zuzuführen;
eine zweite elektrisch leitfähige Einheit mit einem zweiten Verbindungselement (32, 38) sowohl auf der Innenfläche (114) als auch auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) ausgebildet ist und das zweite Verbindungselement (32, 38) sich durch das zweite Durchgangsloch (26) jeder der Mehrzahl von Schichten (141 bis 144) hindurch erstreckt, um der gemeinsamen Elektrode (15; 150) ein zweites Signal zuzuführen;
einen Anschlussstellenabschnitt, der weiter außen als das Anzeigeteil (110) angeordnet ist, wobei der Anschlussstellenabschnitt einen ersten Anschlussstellenabschnitt (18), der mit der gemeinsamen Stromversorgungsleitung (16) verbunden ist, und einen zweiten Anschlussstellenabschnitt (19), der mit der gemeinsamen Elektrode (15; 150) verbunden ist, umfasst; und
eine elektrisch leitfähige Bindeschicht (17), die zwischen dem ersten Anschlussstellenabschnitt (18) und der ersten elektrisch leitfähigen Einheit und zwischen dem zweiten Anschlussstellenabschnitt (19) und der zweiten elektrisch leitfähigen Einheit angeordnet ist, wobei die elektrisch leitfähige Bindeschicht (17) den ersten Anschlussstellenabschnitt (18) mit der ersten elektrisch leitfähigen Einheit elektrisch verbindet und den zweiten Anschlussstellenabschnitt (19) mit der zweiten elektrisch leitfähigen Einheit elektrisch verbindet,
wobei der erste Anschlussstellenabschnitt (18) und der zweite Anschlussstellenabschnitt (19) abwechselnd und wiederholt in einer Richtung des Substrats (11) angeordnet sind.

2. Anzeigevorrichtung (100) nach Anspruch 1, wobei:
die Mehrzahl von Kohlenstofffasern (74, 741-744) einander in der Harzgrundlage (73) kreuzen.

3. Anzeigevorrichtung (100) nach Anspruch 1 oder 2, wobei:
die Kohlenstofffasern (74, 741-744), die auf wenigstens einer Schicht der Mehrzahl von Schichten (141 bis 144) angeordnet sind, und die Kohlenstofffasern (74, 741-744), die auf einer anderen Schicht der Mehrzahl von Schichten (141 bis 144) angeordnet sind, einander kreuzen.

4. Anzeigevorrichtung nach einem vorangehenden Anspruch, wobei:

die erste elektrisch leitfähige Einheit eine Mehrzahl von Metallfilmen (391, 392, 393) umfasst, die voneinander beabstandet und auf einer dem Substrat (11) zugewandten Fläche des Dichtungssubstrats (14; 140) angeordnet sind,
die erste elektrisch leitfähige Einheit eine Mehrzahl von Verbindungselementen (37, 38) umfasst, die jeweils der Mehrzahl von Metallfilmen (391, 392, 393) entsprechen, und
jeder Metallfilm (391, 392, 393) dazu ausgelegt ist, über jedes entsprechende Verbindungselement ein unabhängiges Signal zugeführt zu bekommen.

5. Anzeigevorrichtung (100) nach Anspruch 4, wobei:
die Mehrzahl von Metallfilmen (391, 392, 393) und die Mehrzahl von Verbindungselementen (22, 32, 82, 92, 37, 38) auf der Isolierschicht (41) angeordnet sind.

6. Anzeigevorrichtung (100) nach Anspruch 4 oder 5, wobei:
eine Mehrzahl elektronischer Elemente (36) auf einer Außenfläche (O14) einer am weitesten von dem Anzeigeteil (110) entfernt angeordneten Schicht der Mehrzahl von Schichten (141 bis 144) montiert ist.

7. Anzeigevorrichtung (100) nach Anspruch 6, wobei:
wenigstens zwei elektronische Elemente (36) der Mehrzahl elektronischer Elemente (36) über die Drahtschichten (35) miteinander elektrisch verbunden sind und wenigstens ein elektronisches Element (36) über eines der Mehrzahl von Verbindungselementen (22, 32, 82, 92, 37, 38) mit einem der Metallfilme (391, 392, 393) elektrisch verbunden ist.

8. Anzeigevorrichtung (100) nach Anspruch 1, wobei:

die Isolierschicht (41) auf der Innenfläche (114)

und der Außenfläche (O14) jeder der Mehrzahl von Schichten (141 bis 144) des Dichtungssubstrats (14; 140), der Seitenwand des ersten Durchgangslochs (25) jeder der Mehrzahl von Schichten (141 bis 144) und der Seitenwand des zweiten Durchgangslochs (26) jeder der Mehrzahl von Schichten (141 bis 144) ausgebildet ist, wobei die erste elektrisch leitfähige Einheit und die zweite elektrisch leitfähige Einheit auf der Isolierschicht (41) angeordnet sind.

9. Anzeigevorrichtung (100) nach Anspruch 8, wobei:

die zweite elektrisch leitfähige Einheit eine zweite innere Schicht (31), die mit der Bindeschicht (12; 13) in Kontakt steht, auf der Innenfläche (114) des Dichtungssubstrats (14; 140), die dem Anzeigeteil (110) zugewandt ist, umfasst und dem Anzeigeteil (110) zugewandt ist und
die erste elektrisch leitfähige Einheit eine erste innere Schicht (21) umfasst;
wobei die erste innere Schicht (21) und die zweite innere Schicht (31) auf der Innenfläche (114) des Dichtungssubstrats (14; 140), die dem Anzeigeteil (110) zugewandt ist, ausgebildet und auf der Innenfläche (114) des Dichtungssubstrats (14; 140) voneinander beabstandet sind.

10. Anzeigevorrichtung (100) nach Anspruch 9, wobei:
die zweite innere Schicht (31) durch einen aus einem Aluminiumfilm, einem Aluminiumlegierungsfilm, einem Kupferfilm und einem Kupferlegierungsfilm ausgebildet wird.

11. Anzeigevorrichtung (100) nach Anspruch 9 oder 10, wobei:

die erste elektrisch leitfähige Einheit eine erste äußere Schicht (23) umfasst, die auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) angeordnet ist, und
die erste äußere Schicht (23) in wenigstens einem von Breite und Dicke größer ist als die erste innere Schicht (21).

12. Anzeigevorrichtung (100) nach Anspruch 9, 10 oder 11, wobei:

die zweite elektrisch leitfähige Einheit ferner eine zweite äußere Schicht (33) umfasst, die auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) angeordnet ist, und
die zweite äußere Schicht (33) dicker ist als die zweite innere Schicht (31).

13. Anzeigevorrichtung (100) nach einem der Ansprüche 1 bis 12, wobei:
die gemeinsame Stromversorgungsleitung (16) eine erste gemeinsame Stromversorgungsleitung (161) und eine zweite gemeinsame Stromversorgungsleitung (162) umfasst, die einander kreuzen.

14. Anzeigevorrichtung (100) nach Anspruch 13, wobei:

die erste gemeinsame Stromversorgungsleitung (161) in eine erste ungeradzahlige gemeinsame Stromversorgungsleitung und eine erste geradzahlige gemeinsame Stromversorgungsleitung geteilt ist und die zweite gemeinsame Stromversorgungsleitung (162) in eine zweite ungeradzahlige gemeinsame Stromversorgungsleitung und eine zweite geradzahlige gemeinsame Stromversorgungsleitung geteilt ist; und
die erste elektrisch leitfähige Einheit umfasst: eine dritte elektrisch leitfähige Einheit, die mit der ersten ungeradzahligen gemeinsamen Stromversorgungsleitung und der zweiten ungeradzahligen gemeinsamen Stromversorgungsleitung verbunden ist, um der ersten gemeinsamen Stromversorgungsleitung (161) und der zweiten gemeinsamen Stromversorgungsleitung (162) ein drittes Signal zuzuführen, und eine vierte elektrisch leitfähige Einheit, die mit der ersten geradzahligen gemeinsamen Stromversorgungsleitung und der zweiten geradzahligen gemeinsamen Stromversorgungsleitung verbunden ist, um der ersten gemeinsamen Stromversorgungsleitung (161) und der zweiten gemeinsamen Stromversorgungsleitung (162) ein viertes Signal zuzuführen.

15. Anzeigevorrichtung (100) nach einem der Ansprüche 1 bis 14, wobei:
die leitfähige Bindeschicht (17) in einer Dickenrichtung eine elektrische Leitfähigkeit aufweist, in anderen Richtungen als der Dickenrichtung eine elektrische Isolationsfähigkeit aufweist und sich mit dem ersten Anschlussstellenabschnitt (18) und dem zweiten Anschlussstellenabschnitt (19) überlappt.

16. Anzeigevorrichtung nach Anspruch 15, wobei:

die erste elektrisch leitfähige Einheit eine erste innere Schicht (21), die sich mit dem ersten Anschlussstellenabschnitt (18) überlappt und mit der leitfähigen Bindeschicht (17) in Kontakt steht, und eine erste äußere Schicht (23), die auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) angeordnet ist, umfasst und
die zweite elektrisch leitfähige Einheit eine zweite innere Schicht (31), die sich mit dem zweiten Anschlussstellenabschnitt (19) überlappt und mit der leitfähigen Bindeschicht (17) in Kontakt steht, und eine zweite äußere Schicht (33), die auf der Außenfläche (O14) des Dichtungssubs-

trats (14; 140) angeordnet ist, umfasst.

17. Anzeigevorrichtung (100) nach Anspruch 16, wobei:

die zweite innere Schicht (31) sich zur Mitte des Dichtungssubstrats (14; 140) erstreckt, so dass sie dem Anzeigeteil (110) zugewandt ist, und
die erste innere Schicht (21) weiter außen als die zweite innere Schicht (31) angeordnet und mit einer vorgegebenen Entfernung von der zweiten inneren Schicht (31) beabstandet ist.

18. Anzeigevorrichtung (100) nach Anspruch 16 oder 17, wobei:

die erste äußere Schicht (23) an wenigstens drei Rändern des Dichtungssubstrats (14; 140) angeordnet ist und
die zweite äußere Schicht (33) an den übrigen Rändern des Dichtungssubstrats (14; 140) angeordnet ist.

19. Anzeigevorrichtung (100) nach Anspruch 15, wenn abhängig von Anspruch 14, wobei:

der erste Anschlussstellenabschnitt (18) einen dritten Anschlussstellenabschnitt (76), der mit der ersten ungeradzahligen gemeinsamen Stromversorgungsleitung und der zweiten ungeradzahligen gemeinsamen Stromversorgungsleitung verbunden ist, und einen vierten Anschlussstellenabschnitt (77), der mit der ersten geradzahligen gemeinsamen Stromversorgungsleitung und der zweiten geradzahligen gemeinsamen Stromversorgungsleitung verbunden ist, umfasst,
die ersten Durchgangslöcher (25) jeweils ein drittes Durchgangsloch zum Hindurchführen der dritten elektrisch leitfähigen Einheit und ein viertes Durchgangsloch zum Hindurchführen der vierten elektrisch leitfähigen Einheit umfassen.

20. Anzeigevorrichtung (100) nach Anspruch 19, wobei:

die dritte elektrisch leitfähige Einheit eine dritte innere Schicht (81), die sich mit dem dritten Anschlussstellenabschnitt (76) überlappt und mit der leitfähigen Bindeschicht (17) in Kontakt steht, eine dritte äußere Schicht (83), die auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) angeordnet ist, und ein drittes Verbindungselement (82), das die dritte innere Schicht (81) und die dritte äußere Schicht (83) miteinander verbindet und sich dabei durch jedes dritte Durchgangsloch erstreckt, umfasst und
die vierte elektrisch leitfähige Einheit eine vierte innere Schicht (91), die sich mit dem vierten Anschlussstellenabschnitt (77) überlappt und mit der leitfähigen Bindeschicht (17) in Kontakt steht, eine vierte äußere Schicht (93), die auf der Außenfläche (O14) des Dichtungssubstrats (14; 140) angeordnet ist, und ein viertes Verbindungselement (92), das die vierte innere Schicht (91) und die viertes äußere Schicht (93) miteinander verbindet und sich dabei durch jedes vierte Durchgangsloch erstreckt, umfasst.

21. Anzeigevorrichtung (100) nach Anspruch 20, wobei:

die zweite innere Schicht (31) sich zur Mitte des Dichtungssubstrats (14; 140) erstreckt und dem Anzeigeteil (110) zugewandt ist,
die dritte innere Schicht (81) und die vierte innere Schicht (91) weiter außen als die zweite innere Schicht (31) angeordnet sind und
eine aus der dritten inneren Schicht (81) und der vierten inneren Schicht (91) an vier Rändern des Dichtungssubstrats (14; 140) angeordnet ist.

22. Anzeigevorrichtung (100) nach Anspruch 20 oder 21, wobei:

die dritte äußere Schicht (83) an vier Rändern des Dichtungssubstrats (14; 140) angeordnet ist,
die vierte äußere Schicht (93) parallel zu der dritten äußeren Schicht (83) weiter außen oder innen als die dritte äußere Schicht (83) angeordnet ist und
die zweite äußere Schicht (33) zwischen der dritten äußeren Schicht (83) und der vierten äußeren Schicht (93) angeordnet ist.

Revendications

1. Dispositif d'affichage (100) comprenant :

un substrat (11) ;
une partie d'affichage (110) disposée sur le substrat (11) ;
un substrat d'étanchéité (14 ; 140) lié au substrat (11) par une couche de liaison (12, 13) qui entoure la partie d'affichage (110) ;
dans lequel le substrat d'étanchéité (14 ; 140) est constitué par une pluralité de couches (141 à 144), où chacune de la pluralité de couches est électroconductrice et comprend une base de résine (73) et une pluralité de fibres de carbone (74, 741 à 744),
dans lequel chacune de la pluralité de couches (141 à 144) est entourée par une couche isolante (41) et comporte un premier trou traversant (25), et où des couches de fils (35) sont positionnées parmi la pluralité de couches (141 à

144) ;
au moins un conducteur situé entre le substrat (11) et le substrat d'étanchéité (14 ; 140) ;
une première unité électroconductrice comportant un premier connecteur (22, 38) s'étendant à travers chaque premier trou traversant (25) et venant en contact avec au moins l'un desdits conducteurs ;
dans lequel la couche isolante (41) est disposée sur la surface interne (114) et la surface externe (014) de chacune de la pluralité de couches (141 à 144) et sur une paroi latérale de chaque premier trou traversant (25) ;
dans lequel la partie d'affichage (110) comprend une pluralité de pixels, chacun comprenant une diode électroluminescente organique (60) et une unité de circuit d'attaque, où la diode électroluminescente organique (60) comporte une électrode de pixel (61), et une couche d'émission organique (62) et une électrode commune (15 ; 150) et dans lequel l'unité de circuit d'attaque comporte un transistor à couche mince d'attaque ;
dans lequel ledit au moins un conducteur comprend une ligne d'alimentation électrique commune (16) configurée pour appliquer une tension commune aux transistors à film mince, et à l'électrode commune (15 ; 150) ;
chacune de la pluralité de couches (141 à 144) du substrat d'étanchéité (14 ; 140) comprend un deuxième trou traversant (26) ;
la première unité électroconductrice est formée sur une surface interne (114) et une surface externe (014) du substrat d'étanchéité (14 ; 140) et le premier connecteur (22) s'étend à travers ledit premier trou traversant (25) de chacune de la pluralité de couches (141 à 144) pour fournir un premier signal à la ligne d'alimentation électrique commune (16) ;
une deuxième unité électroconductrice comportant un deuxième connecteur (32, 38) est formée à la fois sur la surface interne (114) et la surface externe (014) du substrat d'étanchéité (14 ; 140) et le deuxième connecteur (32, 38) s'étend à travers le deuxième trou traversant (26) de chacune de la pluralité de couches (141 à 144) pour fournir un deuxième signal à l'électrode commune (15 ; 150) ;
une section de plot positionnée à l'extérieur de la partie d'affichage (110), la section de plot comprenant une première section de plot (18) qui est reliée à la ligne d'alimentation électrique commune (16) et une deuxième section de plot (19) qui est reliée à l'électrode commune (15 ; 150) ; et
une couche de liaison électroconductrice (17) positionnée entre la première section de plot (18) et la première unité électroconductrice et entre la deuxième section de plot (19) et la deuxième unité électroconductrice, la couche de liaison électroconductrice (17) reliant électriquement la première section de plot (18) à la première unité électroconductrice et reliant électriquement la deuxième section de plot (19) à la deuxième unité électroconductrice,
dans lequel la première section de plot (18) et la deuxième section de plot (19) sont disposées de manière alternée et répétitive dans une direction du substrat (11).

2. Dispositif d'affichage (100) selon la revendication 1, dans lequel :
la pluralité de fibres de carbone (74, 741 à 744) se croisent dans la base de résine (73).

3. Dispositif d'affichage (100) selon la revendication 1 ou 2, dans lequel :
les fibres de carbone (74, 741 à 744) disposées sur au moins une couche de la pluralité de couches (141 à 144) et les fibres de carbone (74, 741 à 744) disposées sur une autre couche de la pluralité de couches (141 à 144) se croisent.

4. Dispositif d'affichage selon l'une des revendications précédentes, dans lequel :

la première unité électroconductrice comporte une pluralité de films métalliques (391, 392, 393) qui sont espacés les uns des autres et positionnés sur une surface du substrat d'étanchéité (14 ; 140) faisant face au substrat (11),
la première unité électroconductrice comporte une pluralité de connecteurs (37, 38) correspondant à la pluralité de films métalliques (391, 392, 393), respectivement, et
chaque film métallique (391, 392, 393) est adapté pour être alimenté en un signal indépendant par l'intermédiaire de chaque connecteur correspondant.

5. Dispositif d'affichage (100) selon la revendication 4, dans lequel :
la pluralité de films métalliques (391, 392, 393) et la pluralité de connecteurs (22, 32, 82, 92, 37, 38) sont positionnées sur la couche isolante (41).

6. Dispositif d'affichage (100) selon la revendication 4 ou 5, dans lequel :
une pluralité d'éléments électroniques (36) sont montés sur une surface externe (014) d'une couche qui est disposée la plus éloignée de la partie d'affichage (110) parmi la pluralité de couches (141 à 144).

7. Dispositif d'affichage (100) selon la revendication 6, dans lequel :

au moins deux éléments électroniques (36) de la pluralité d'éléments électroniques (36) sont reliés électriquement l'un à l'autre à travers les couches de fils (35), et au moins un élément électronique (36) est relié électriquement à l'un des films métalliques (391, 392, 393) par l'intermédiaire de l'un de la pluralité de connecteurs (22, 32, 82, 92, 37, 38).

8. Dispositif d'affichage (100) selon la revendication 1, dans lequel :

la couche isolante (41) est formée sur la surface interne (I14) et la surface externe (O14) de chacune de la pluralité de couches (141 à 144) du substrat d'étanchéité (14 ; 140), sur la paroi latérale dudit premier trou traversant (25) de chacune de la pluralité de couches (141 à 144) et sur la paroi latérale du deuxième trou traversant (26) de chacune de la pluralité de couches (141 à 144),
dans lequel la première unité électroconductrice et la deuxième unité électroconductrice sont disposées sur la couche isolante (41).

9. Dispositif d'affichage (100) selon la revendication 8, dans lequel :

la deuxième unité électroconductrice comporte une deuxième couche interne (31) qui est en contact avec la couche de liaison (12 ; 13) sur la surface interne (I14) du substrat d'étanchéité (14 ; 140) faisant face à la partie d'affichage (110) et fait face à la partie d'affichage (110), et la première unité électroconductrice comporte une première couche interne (21) ;
dans lequel la première couche interne (21) et la deuxième couche interne (31) sont formées sur la surface interne (I14) du substrat d'étanchéité (14 ; 140) faisant face à la partie d'affichage (110) et sont espacées l'une de l'autre sur la surface interne (I14) du substrat d'étanchéité (14 ; 140).

10. Dispositif d'affichage (100) selon la revendication 9, dans lequel :
la deuxième couche interne (31) est formée par l'un quelconque d'un film en aluminium, d'un film en alliage d'aluminium, d'un film en cuivre et d'un film en alliage de cuivre.

11. Dispositif d'affichage (100) selon la revendication 9 ou 10, dans lequel :

la première unité électroconductrice comprend une première couche externe (23) qui est positionnée sur la surface externe (O14) du substrat d'étanchéité (14 ; 140), et
la première couche externe (23) a au moins l'une de la largeur et de l'épaisseur supérieure à celle de la première couche interne (21).

12. Dispositif d'affichage (100) selon la revendication 9, 10 ou 11, dans lequel :

la deuxième unité électroconductrice comprend en outre une deuxième couche externe (33) qui est positionnée sur la surface externe (O14) du substrat d'étanchéité (14 ; 140), et
la deuxième couche externe (33) est plus épaisse que la deuxième couche interne (31).

13. Dispositif d'affichage (100) selon l'une des revendications 1 à 12, dans lequel :
la ligne d'alimentation électrique commune (16) comprend une première ligne d'alimentation électrique commune (161) et une deuxième ligne d'alimentation électrique commune (162) qui se croisent.

14. Dispositif d'affichage (100) selon la revendication 13, dans lequel :

la première ligne d'alimentation électrique commune (161) est divisée en une première ligne d'alimentation électrique commune de $n^{ième}$ ordre impair et une première ligne d'alimentation électrique commune de $n^{ième}$ ordre pair, et la deuxième ligne d'alimentation électrique commune (162) est divisée en une deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre impair et une deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre pair ; et
la première unité électroconductrice comprend une troisième unité électroconductrice qui est reliée à la première ligne d'alimentation électrique commune de $n^{ième}$ ordre impair et à la deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre impair pour fournir un troisième signal à la première ligne d'alimentation électrique commune (161) et à la deuxième ligne d'alimentation électrique commune (162), et une quatrième unité électroconductrice qui est reliée à la première ligne d'alimentation électrique commune de $n^{ième}$ ordre pair et à la deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre pair pour fournir un quatrième signal à la première ligne d'alimentation électrique commune (161) et à la deuxième ligne d'alimentation électrique commune (162).

15. Dispositif d'affichage (100) selon l'une des revendications 1 à 14, dans lequel :
la couche de liaison conductrice (17) présente une conductivité électrique dans la direction de l'épaisseur, présente une isolation électrique dans des directions autres que la direction de l'épaisseur, et est chevauchée par la première section de plot (18) et

la deuxième section de plot (19).

16. Dispositif d'affichage de la revendication 15, dans lequel :

la première unité électroconductrice comprend une première couche interne (21) qui est chevauchée par la première section de plot (18) et est en contact avec la couche de liaison conductrice (17), et une première couche externe (23) positionnée sur la surface externe (O14) du substrat d'étanchéité (14 ; 140), et
la deuxième unité électroconductrice comprend une deuxième couche interne (31) qui est chevauchée par la deuxième section de plot (19) et est en contact avec la couche de liaison conductrice (17), et une deuxième couche externe (33) positionnée sur la surface externe (014) du substrat d'étanchéité (14 ; 140).

17. Dispositif d'affichage (100) selon la revendication 16, dans lequel :

la deuxième couche interne (31) s'étend jusqu'au centre du substrat d'étanchéité (14 ; 140) pour faire face à la partie d'affichage (110), et
la première couche interne (21) est disposée à l'extérieur de la deuxième couche interne (31) et est espacée de la deuxième couche interne (31) d'une distance prédéterminée.

18. Dispositif d'affichage (100) selon la revendication 16 ou 17, dans lequel :

la première couche externe (23) est positionnée au niveau d'au moins trois bords du substrat d'étanchéité (14 ; 140), et
la deuxième couche externe (33) est positionnée au niveau des bords restants du substrat d'étanchéité (14 ; 140) .

19. Dispositif d'affichage (100) selon la revendication 15 lorsqu'elle dépend de la revendication 14, dans lequel :

la première section de plot (18) comprend une troisième section de plot (76) reliée à la première ligne d'alimentation électrique commune de $n^{ième}$ ordre impair et à la deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre impair et une quatrième section de plot (77) qui est reliée à la première ligne d'alimentation électrique commune de $n^{ième}$ ordre pair et à la deuxième ligne d'alimentation électrique commune de $n^{ième}$ ordre pair,
les premiers trous traversants (25) comprennent chacun un troisième trou traversant pour le passage de la troisième unité électroconductrice et un quatrième trou traversant pour le passage de la quatrième unité électroconductrice.

20. Dispositif d'affichage (100) selon la revendication 19, dans lequel :

la troisième unité électroconductrice comprend une troisième couche interne (81) qui est chevauchée par la troisième section de plot (76) et est en contact avec la couche de liaison conductrice (17), une troisième couche externe (83) positionnée sur la surface externe (O14) du substrat d'étanchéité (14 ; 140), et un troisième connecteur (82) qui relie la troisième couche interne (81) et la troisième couche externe (83) l'une à l'autre tout en s'étendant à travers chaque troisième trou traversant, et
la quatrième unité électroconductrice comprend une quatrième couche interne (91) qui est chevauchée par la quatrième section de plot (77) et est en contact avec la couche de liaison conductrice (17), une quatrième couche externe (93) positionnée sur la surface externe (O14) du substrat d'étanchéité (14 ; 140), et un quatrième connecteur (92) qui relie la quatrième couche interne (91) et la quatrième couche externe (93) l'une à l'autre tout en s'étendant à travers chaque quatrième trou traversant.

21. Dispositif d'affichage (100) selon la revendication 20, dans lequel :

la deuxième couche interne (31) s'étend jusqu'au centre du substrat d'étanchéité (14 ; 140) et fait face à la partie d'affichage (110),
la troisième couche interne (81) et la quatrième couche interne (91) sont positionnées à l'extérieur de la deuxième couche interne (31), et
l'une quelconque de la troisième couche interne (81) et de la quatrième couche interne (91) est positionnée au niveau de quatre bords du substrat d'étanchéité (14 ; 140).

22. Dispositif d'affichage (100) selon la revendication 20 ou 21, dans lequel :

la troisième couche externe (83) est positionnée au niveau de quatre bords du substrat d'étanchéité (14 ; 140),
la quatrième couche externe (93) est positionnée parallèlement à la troisième couche externe (83) à l'extérieur ou à l'intérieur de la troisième couche externe (83), et
la deuxième couche externe (33) est positionnée entre la troisième couche externe (83) et la quatrième couche externe (93).

FIG. 1

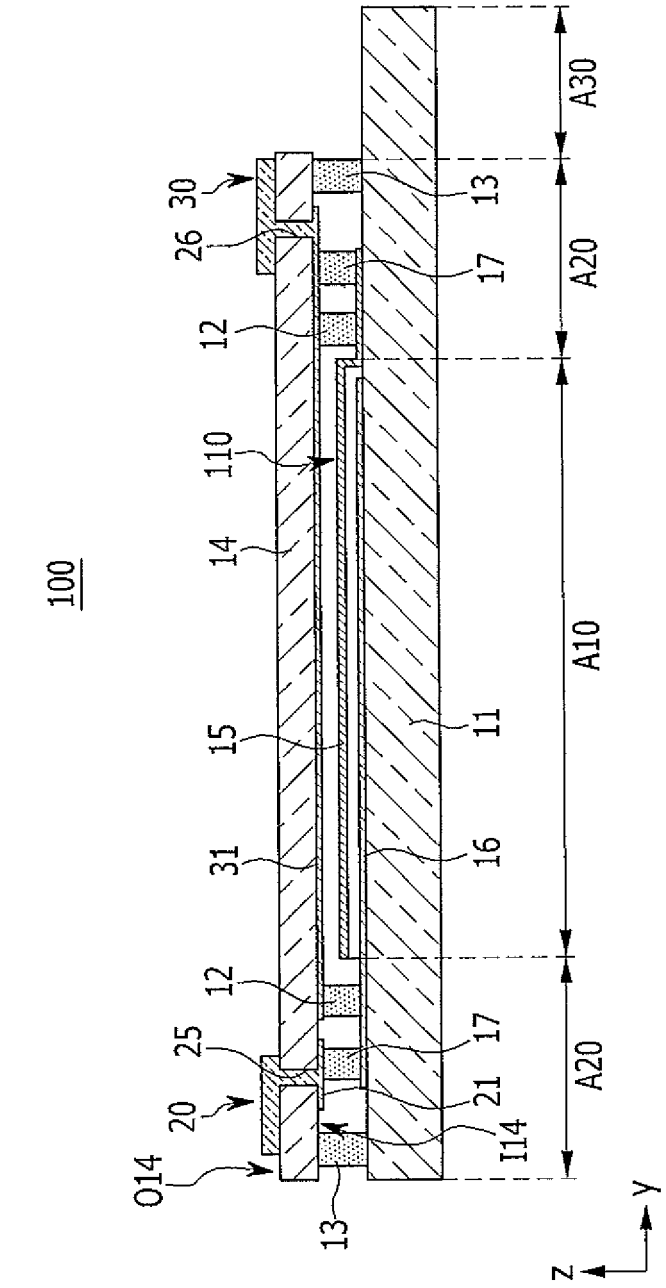

100
A30
A20
A10
A20
30
26
12
110
14
15
31
12
25
20
O14
13
13
17
17
11
16
17
21
I14
y
z

FIG. 2

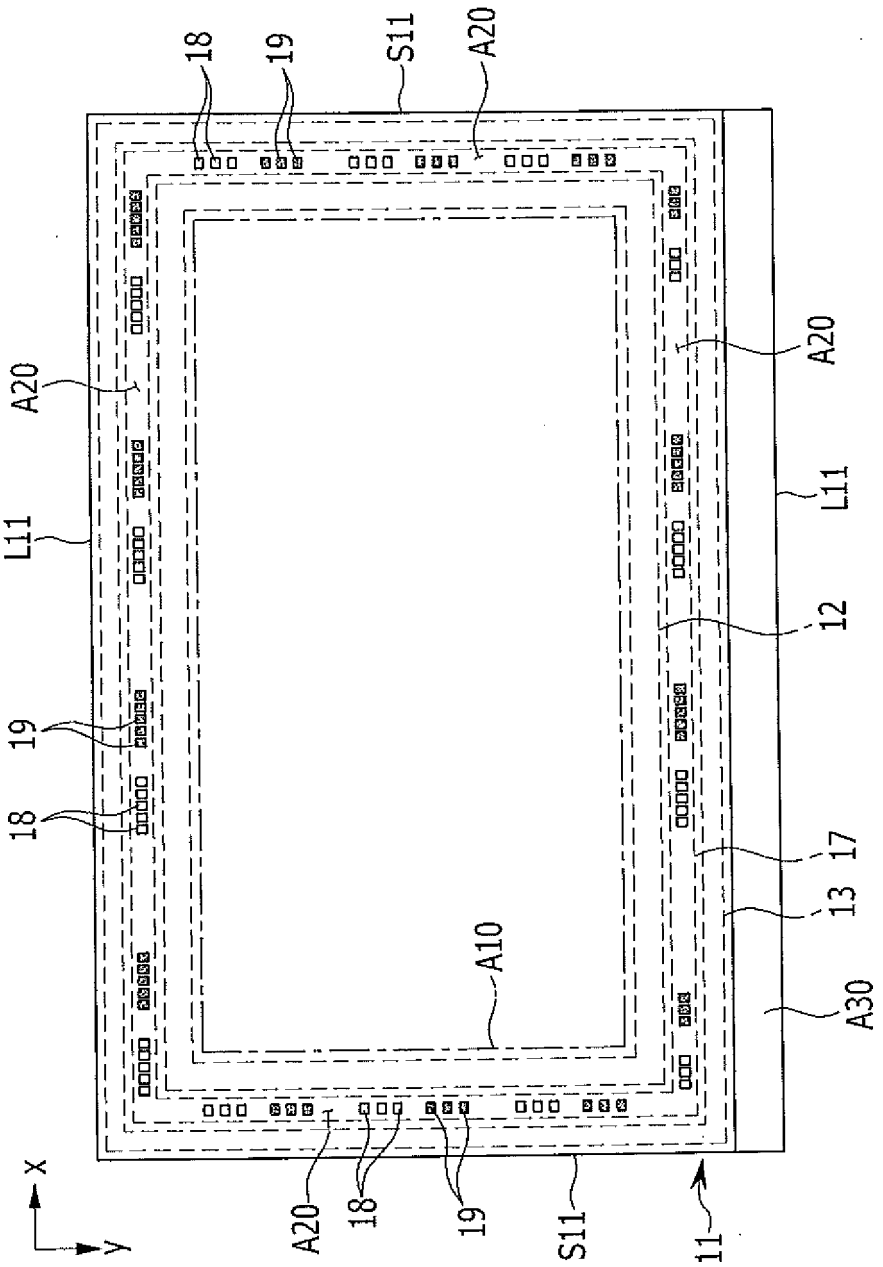

18
19
S11
A20
A20
L11
A20
L11
12
19
18
17
13
A10
A30
x
y
A20
18
19
S11
11

FIG. 3

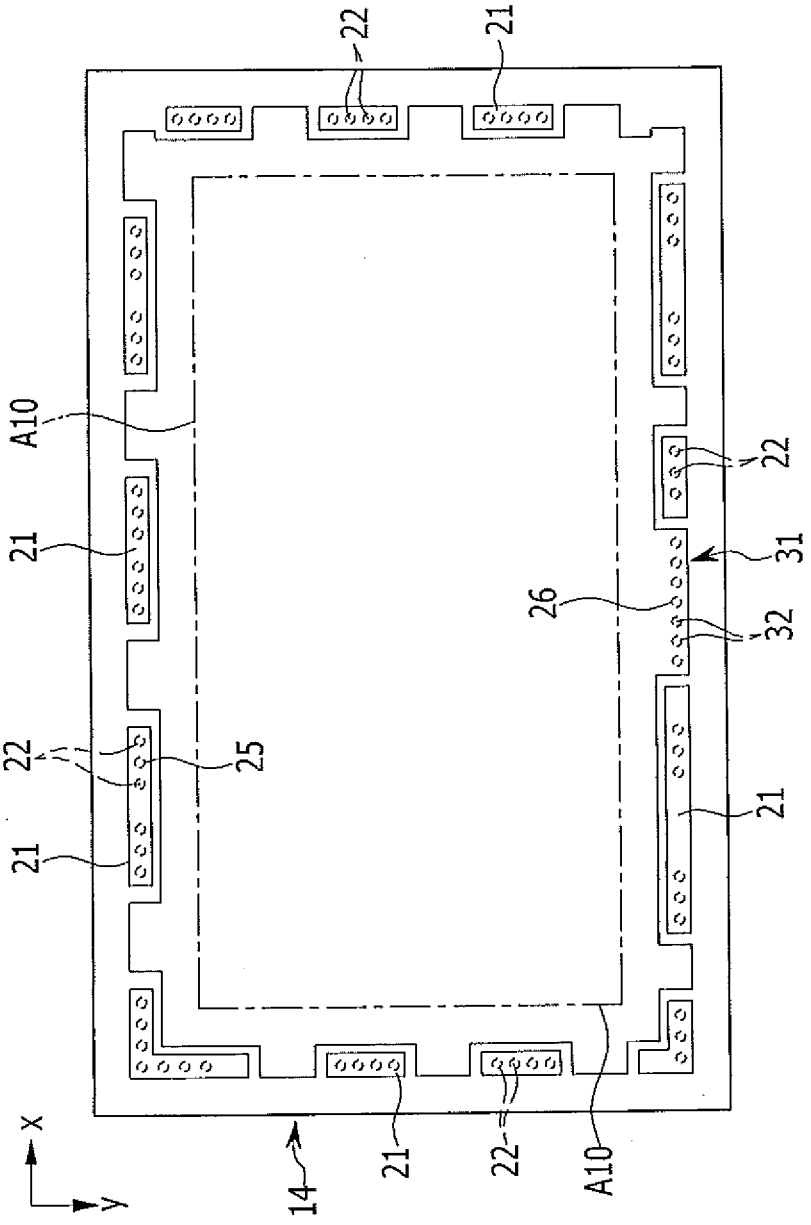


FIG. 4

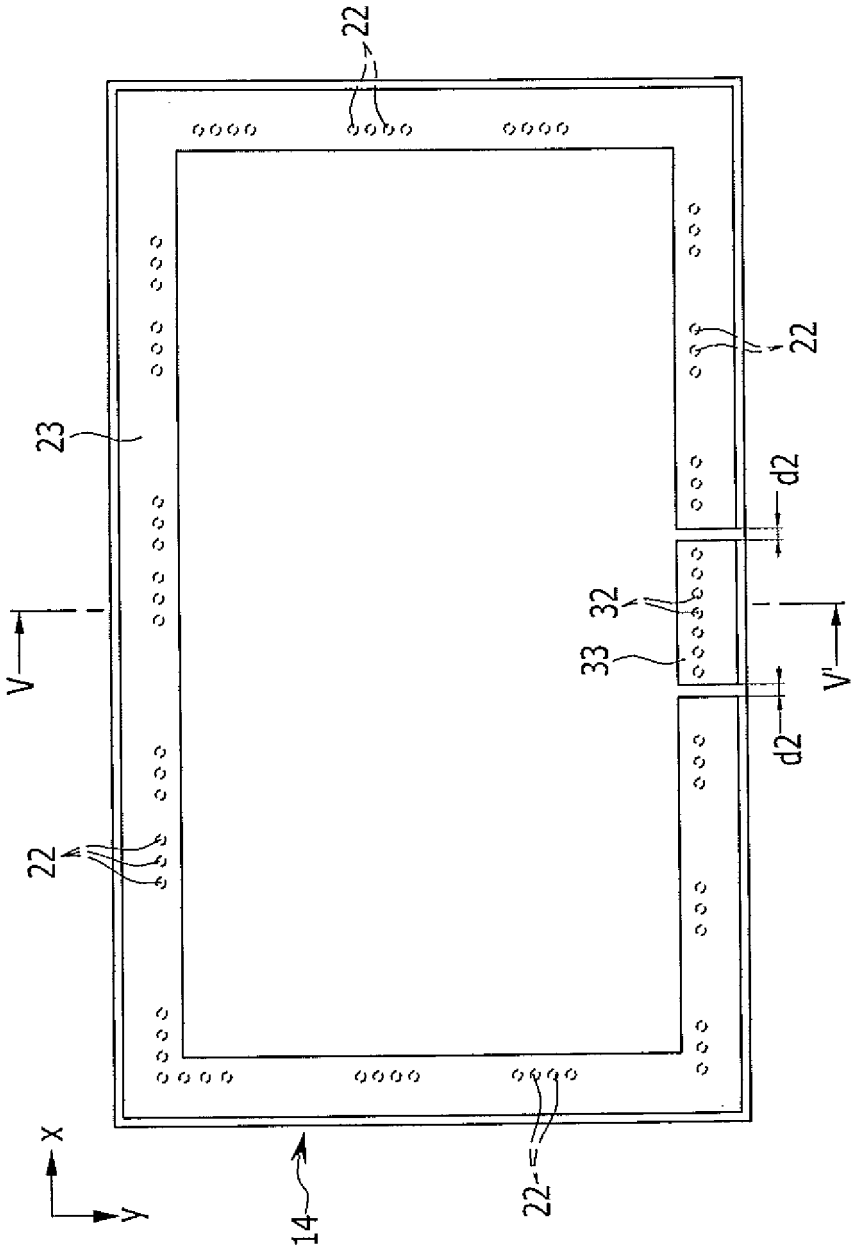


FIG. 5

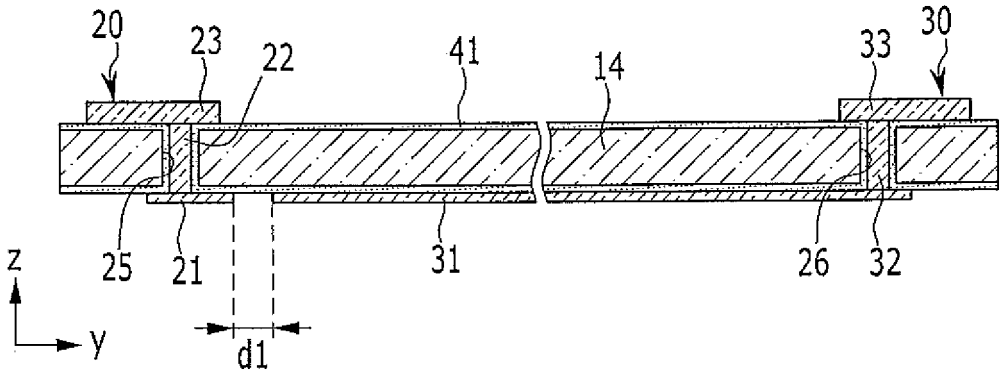
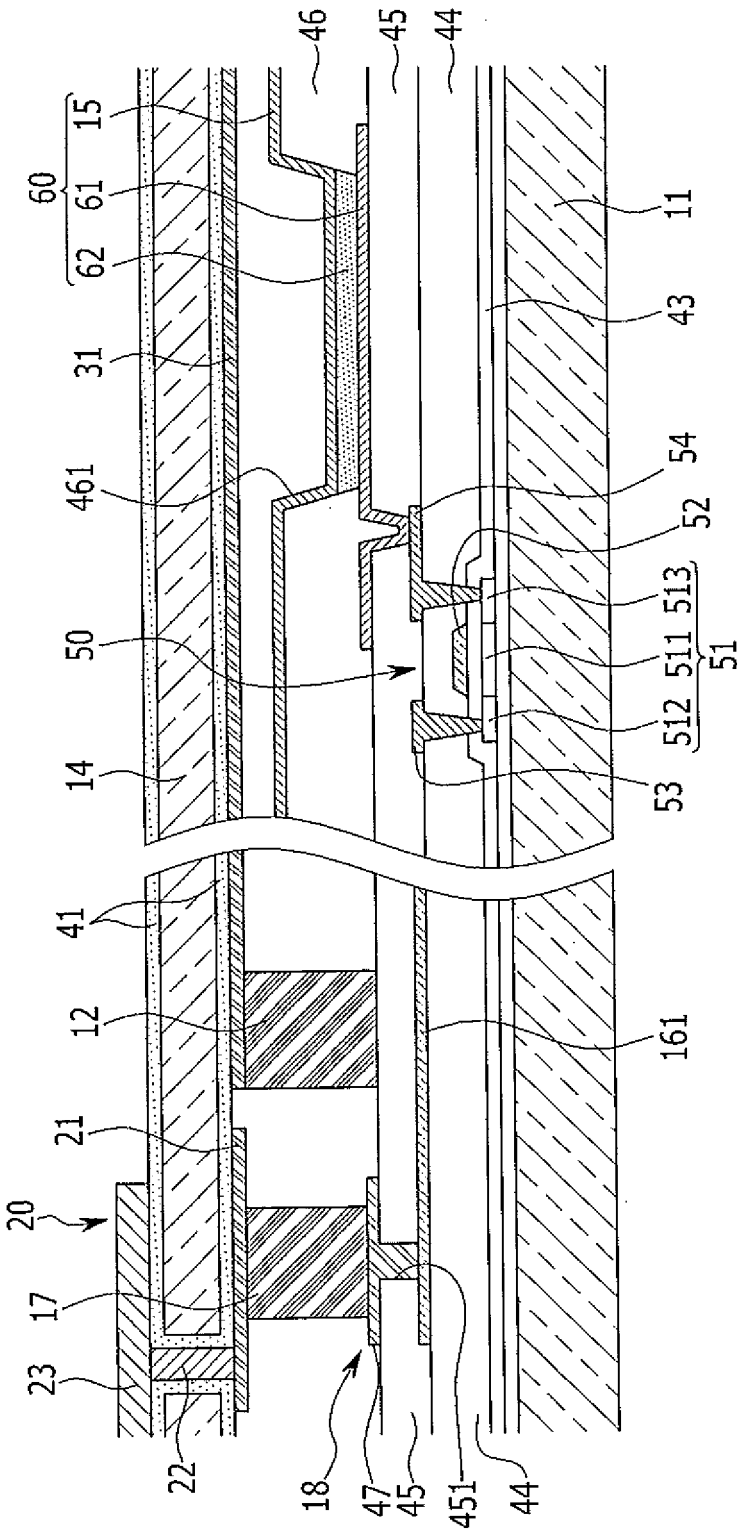


FIG. 6


46
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44
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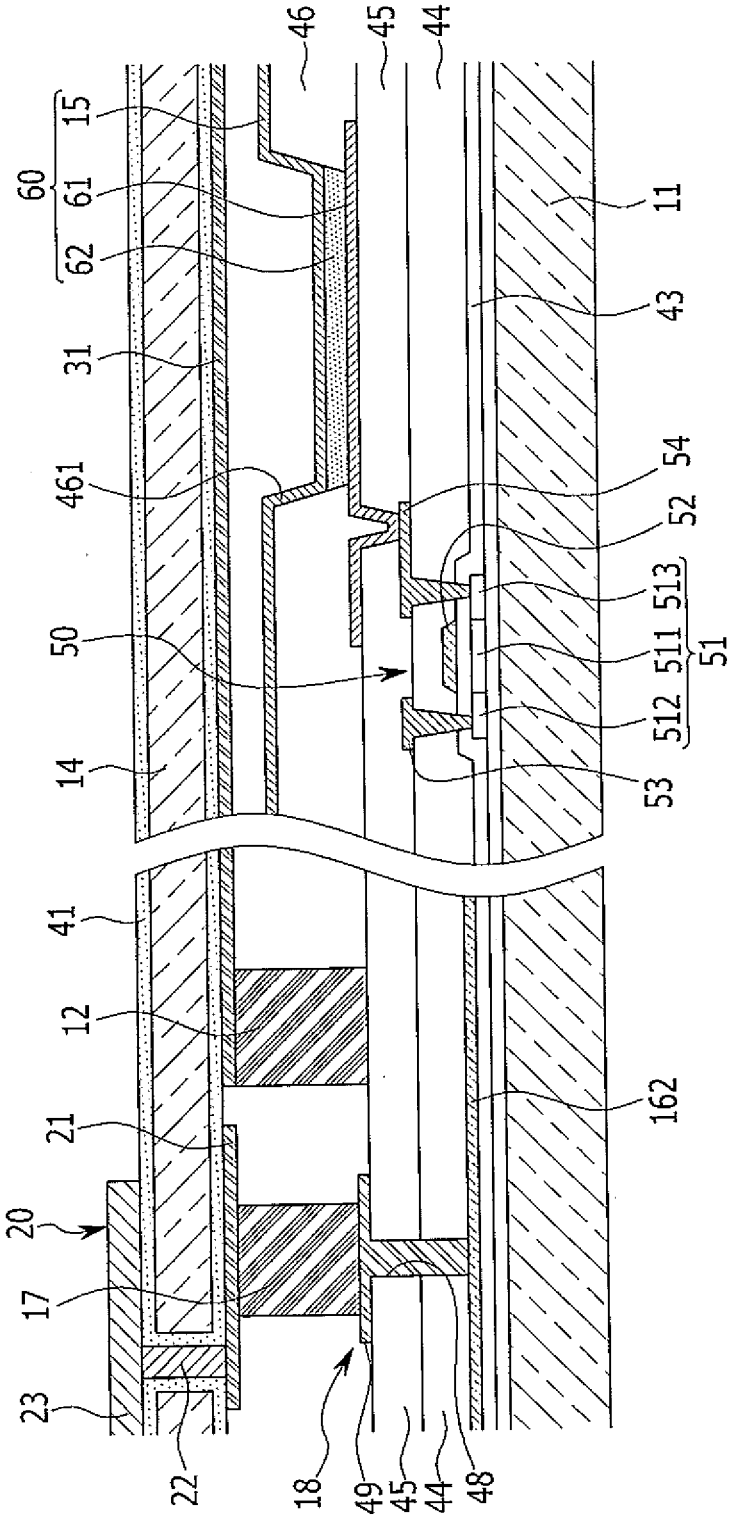
15
61
62
11
31
43
461
54
52
513
50
511
51
512
14
53
41
12
161
21
20
17
23
22
18
47
45
451
44

FIG. 7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52
513
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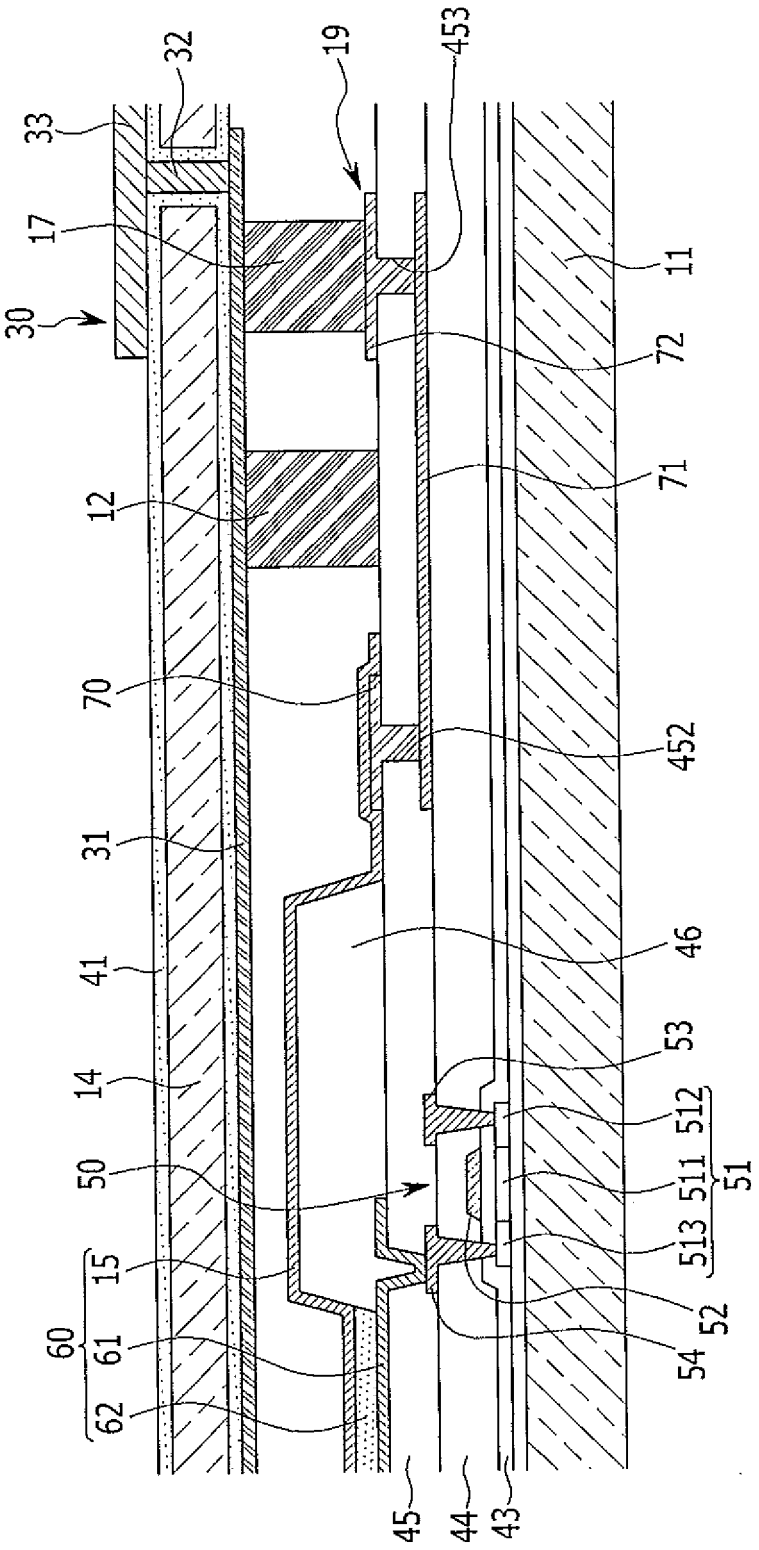
41
12
162
21
20
17
23
22
18
49
45
44
48

FIG. 8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453
33
17
11
30
72
71
12
70
452
31
46
41
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50
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51
513
15
52
60
61
54
62
45
44
43

FIG. 9

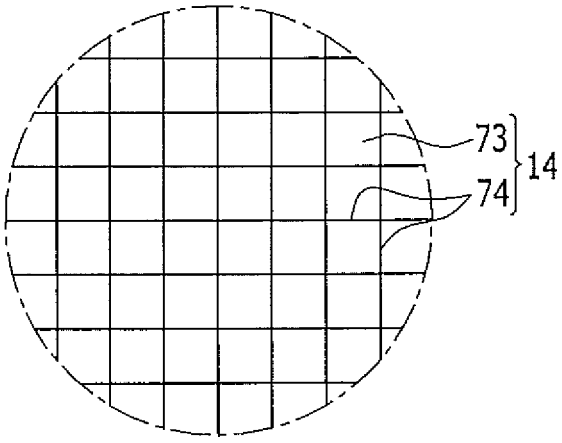


FIG. 10

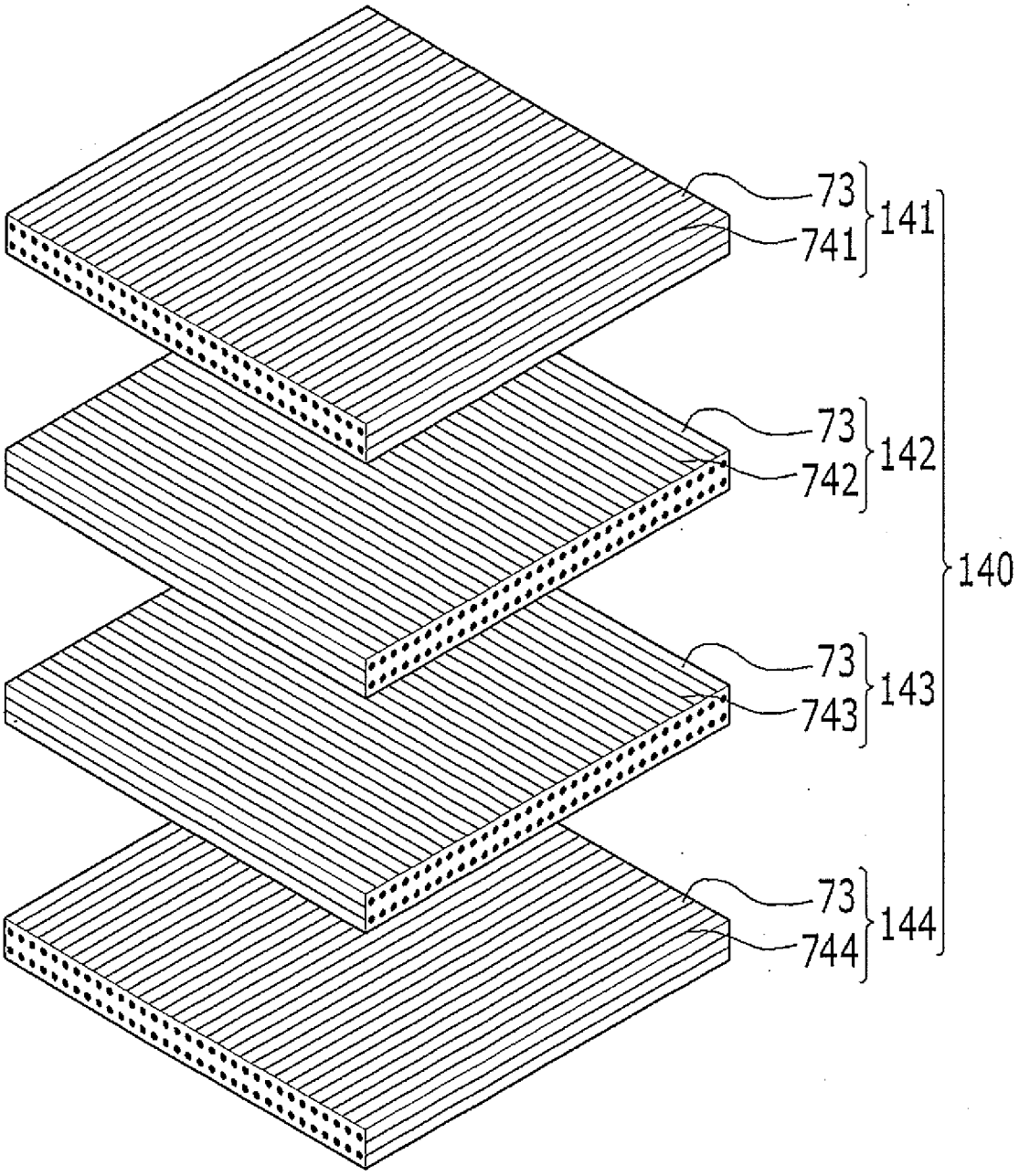


FIG. 11

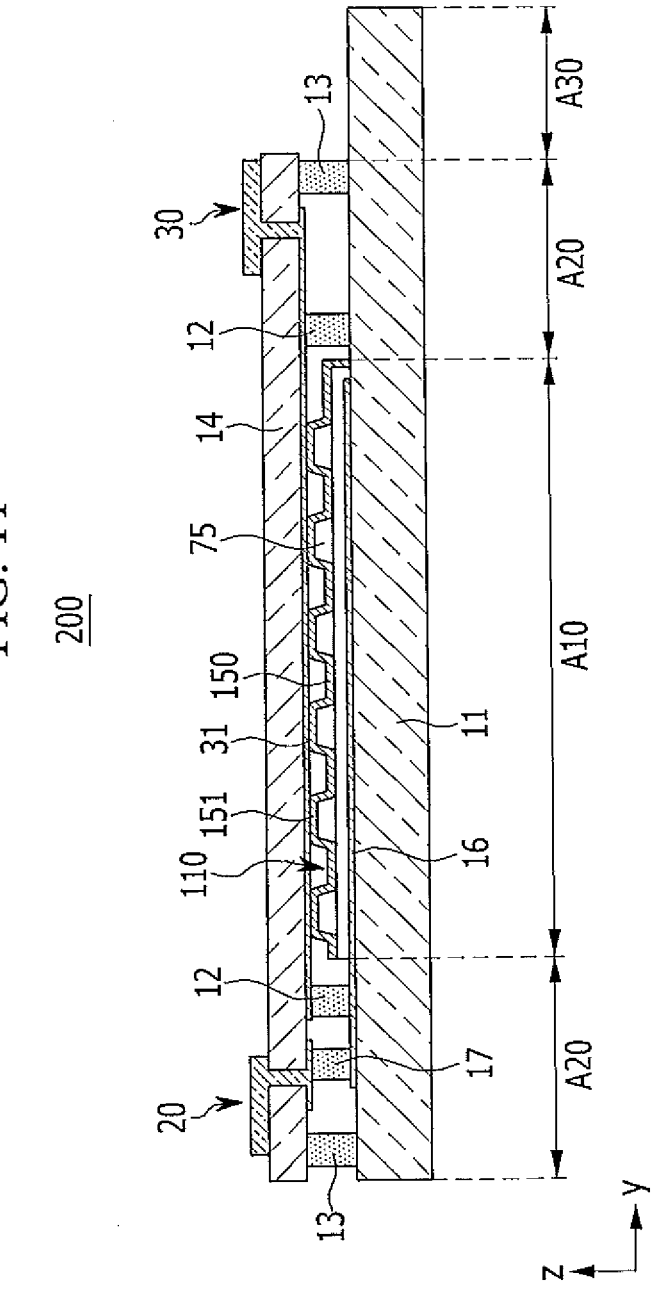

200
13
30
12
14
75
150
31
151
110
12
20
13
11
16
17
A30
A20
A10
A20
y
z

FIG. 12

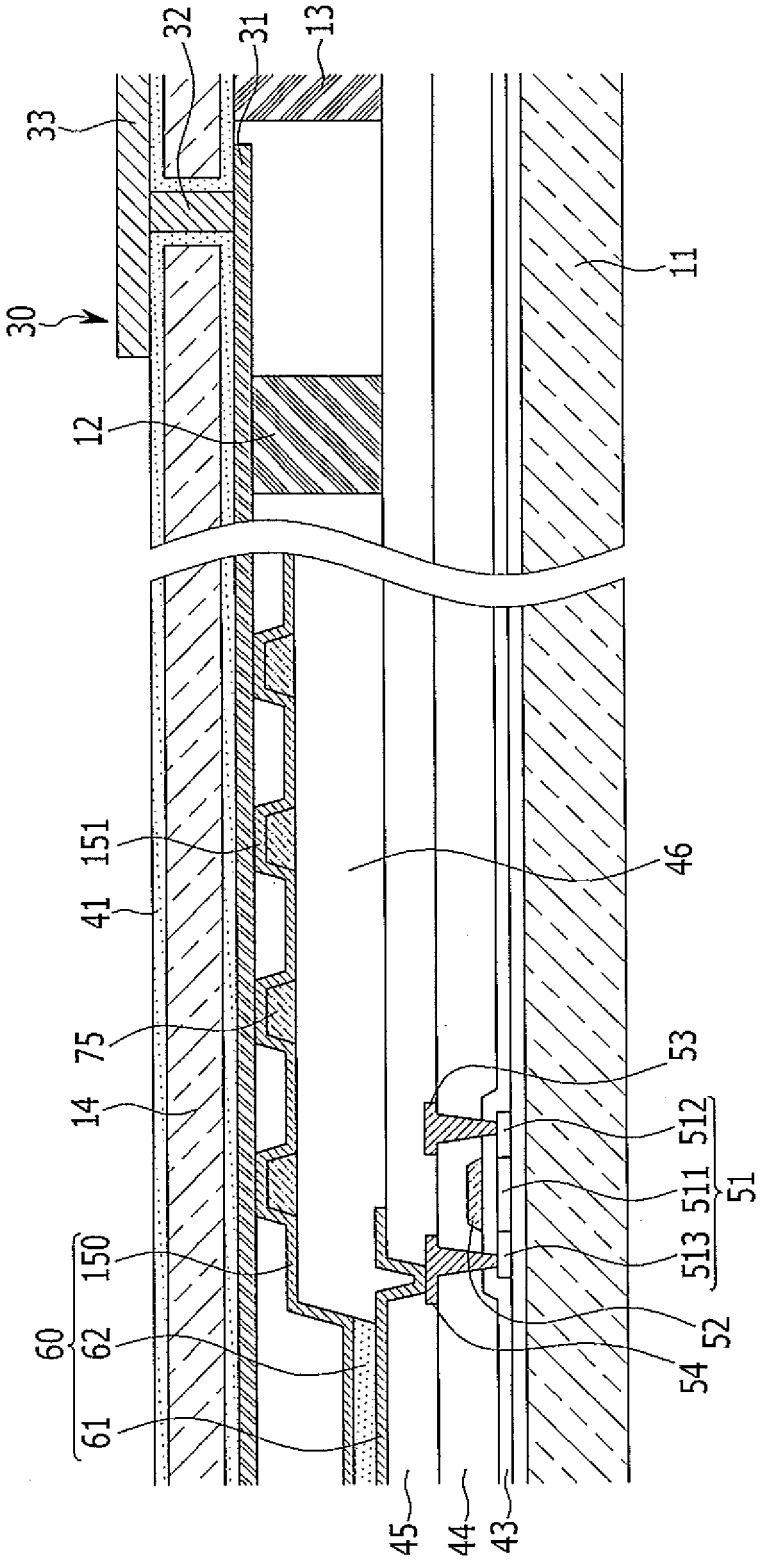

32
31
13
33
30
12
11
151
41
46
75
53
14
512
511
51
513
150
52
60
62
54
61
45
44
43

FIG. 13

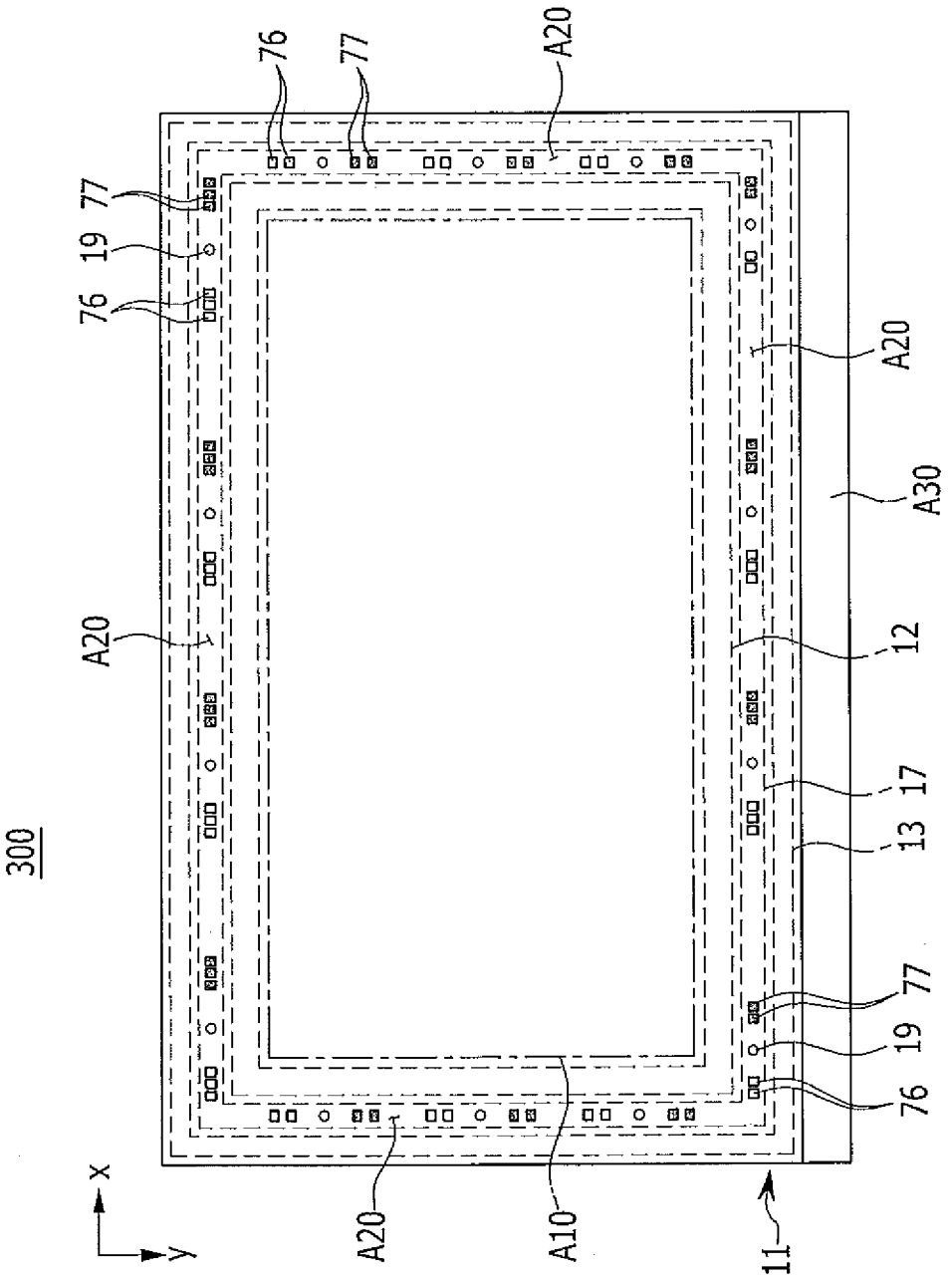


FIG. 14

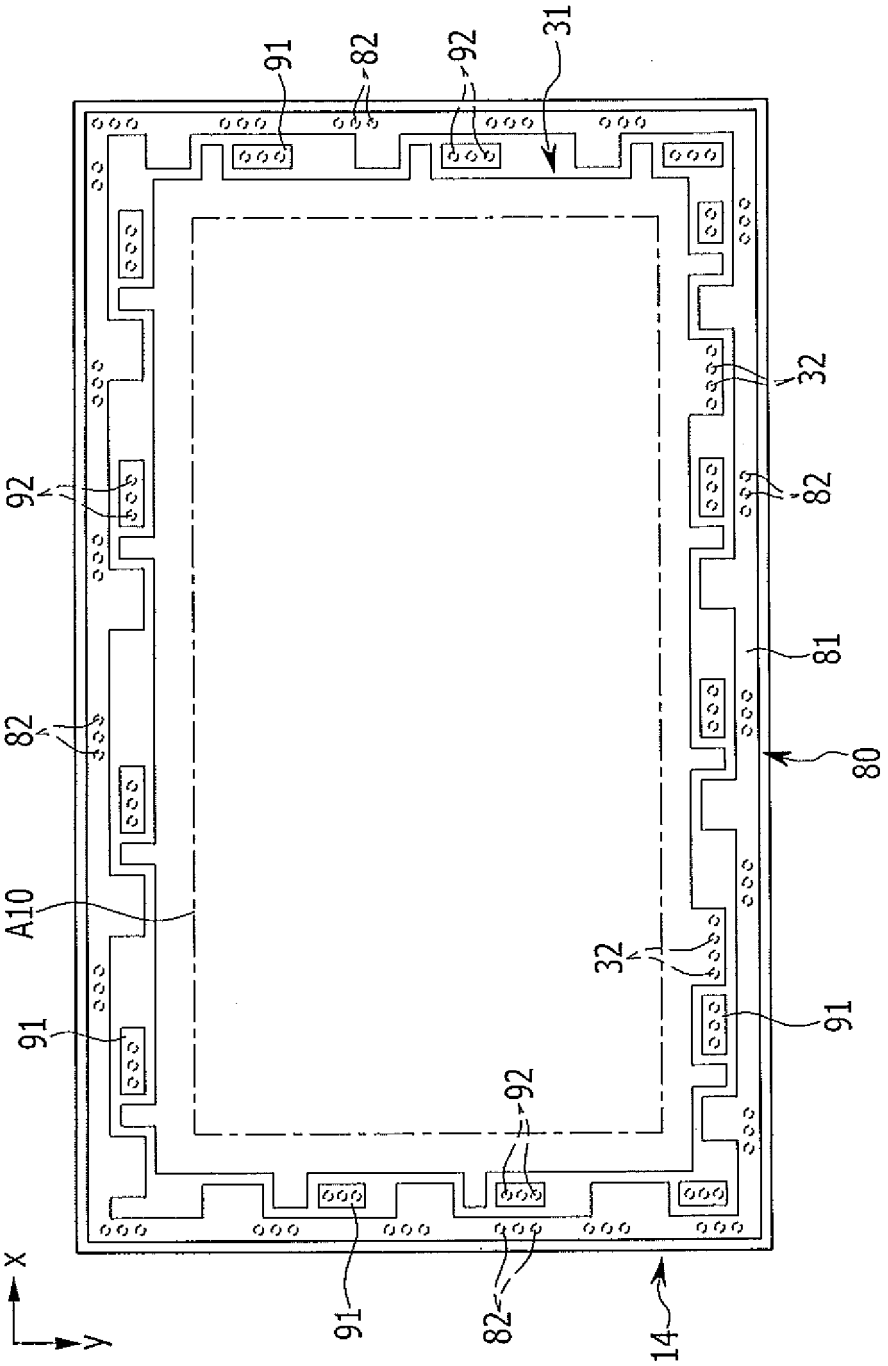


FIG. 15

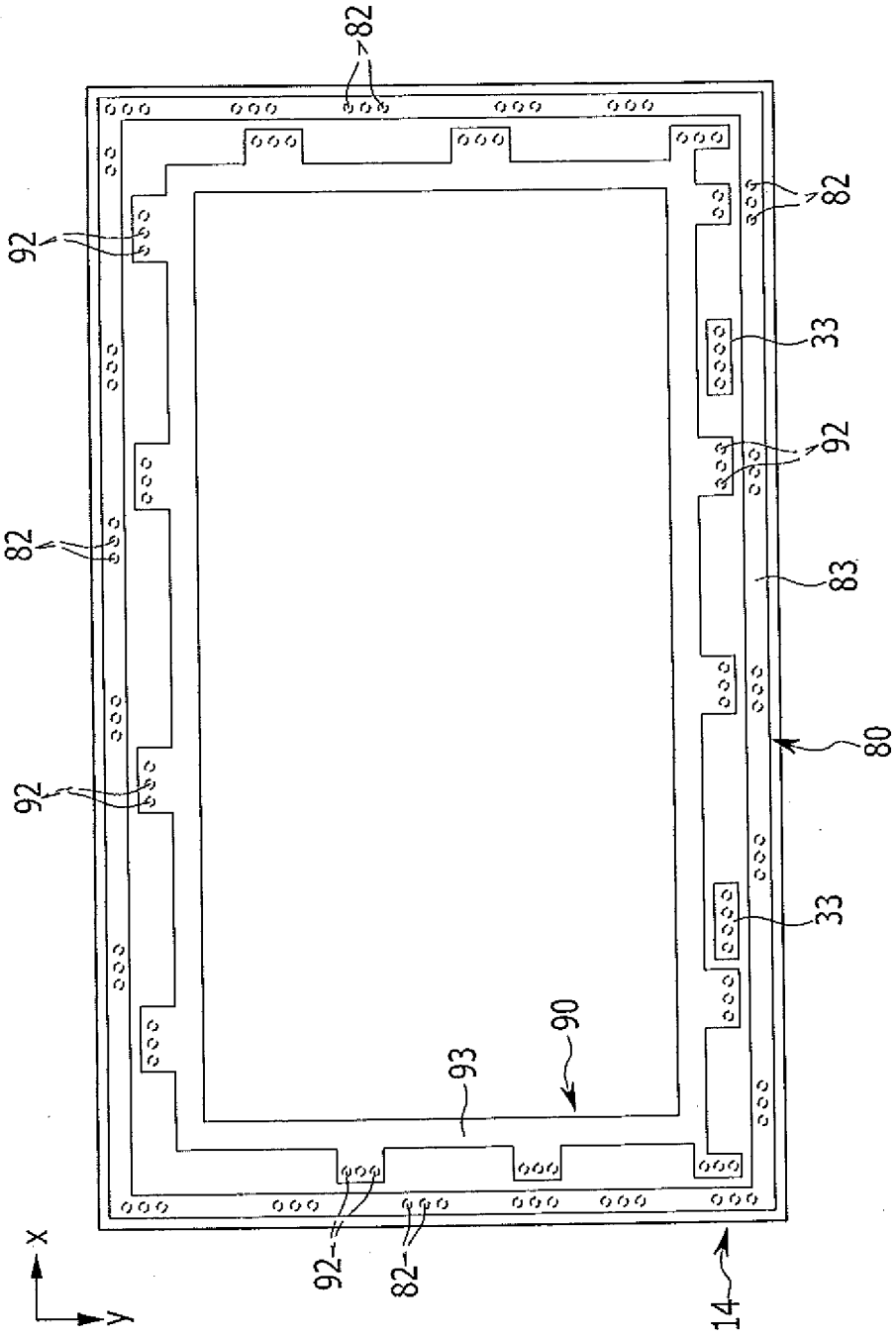


FIG. 16A

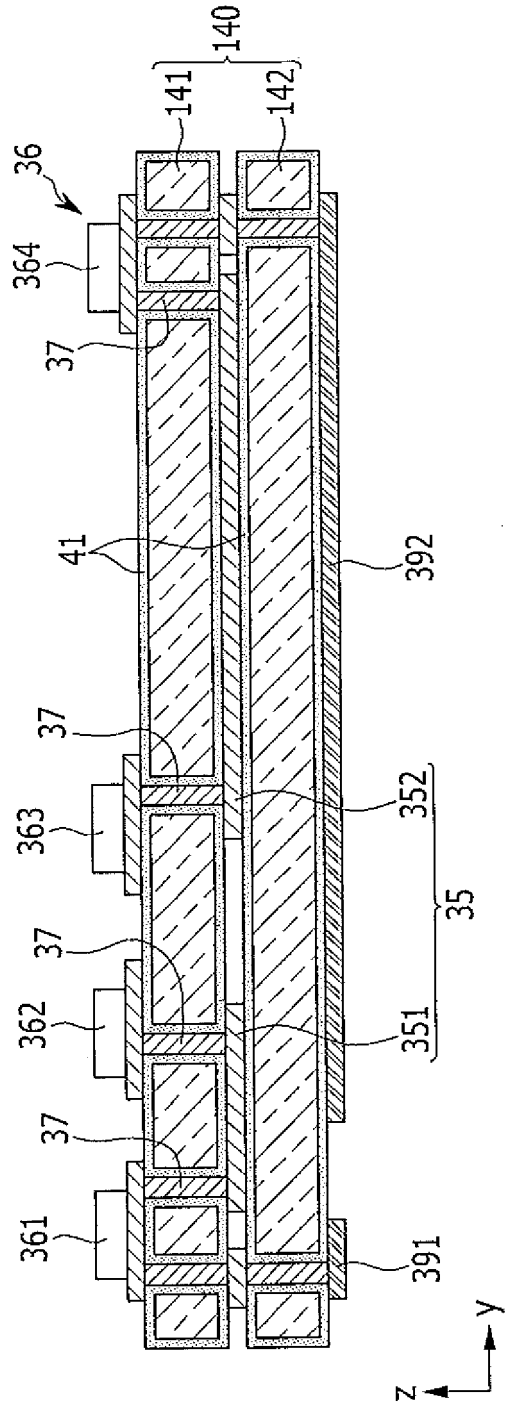
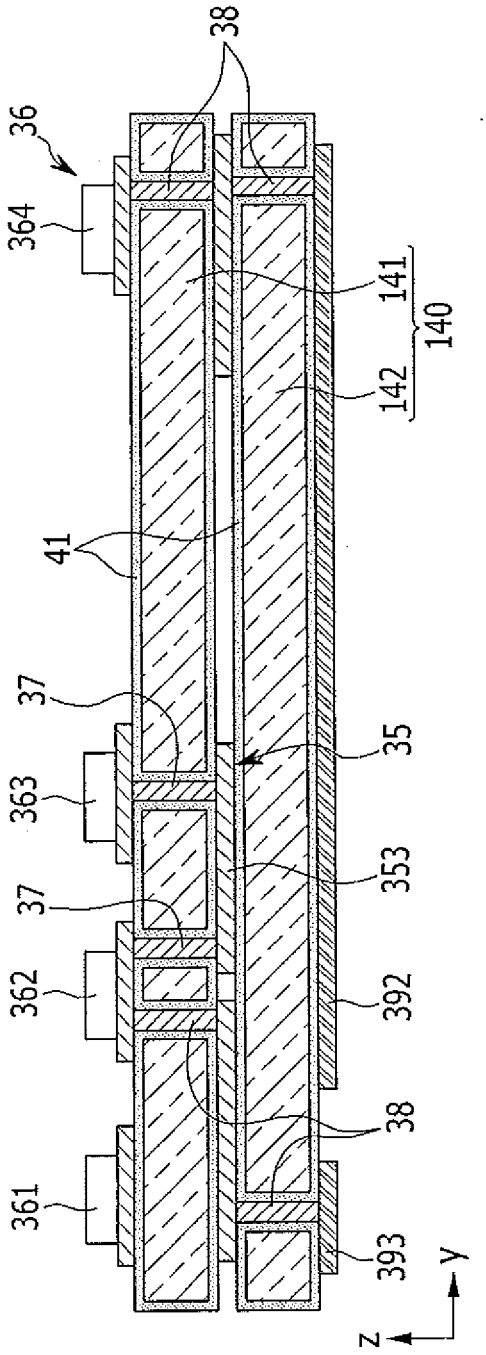


FIG. 16B



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1109224 A **[0005]**
- US 2009095521 A **[0006]**
- US 2005179374 A **[0007]**
- EP 2081180 A **[0008]**

专利名称(译)	显示装置和有机发光二极管显示装置		
公开(公告)号	EP2413363B1	公开(公告)日	2019-04-24
申请号	EP2011175877	申请日	2011-07-28
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星移动显示器有限公司.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
[标]发明人	RYU DO HYUNG KO CHUN SEOK KIM SANG SOO		
发明人	RYU, DO-HYUNG KO, CHUN-SEOK KIM, SANG-SOO		
IPC分类号	H01L27/32 H01L51/52		
CPC分类号	H01L27/3276 H01L51/524 H01L51/5243 H01L51/5246 H01L27/3216 H01L27/3218 H01L51/5203 H05B33/04 H01L51/52 H01L51/5287 H05K1/0366		
优先权	1020100073023 2010-07-28 KR 1020110055089 2011-06-08 KR		
其他公开文献	EP2413363A2 EP2413363A3		
外部链接	Espacenet		

摘要(译)

一个实施方案提供了一种有机发光二极管显示装置，其包括基板（11）；显示单元（110），形成在基板上，包括公共电源线（16）和公共电极（15）;密封基板（14），其通过包围显示单元的粘合层（12,13）附着到基板，密封基板包括树脂基底和碳纤维，密封基板包括第一通孔和第二通孔通孔;第一导电单元（20），通过第一通孔（25）形成在密封基板的内表面和外表面上，第一导电单元将第一信号提供给公共电源线;第二导电单元（30）通过第二通孔（26）形成在密封基板的内表面和外表面上，第二导电单元向公共电极提供第二信号。

FIG. 1