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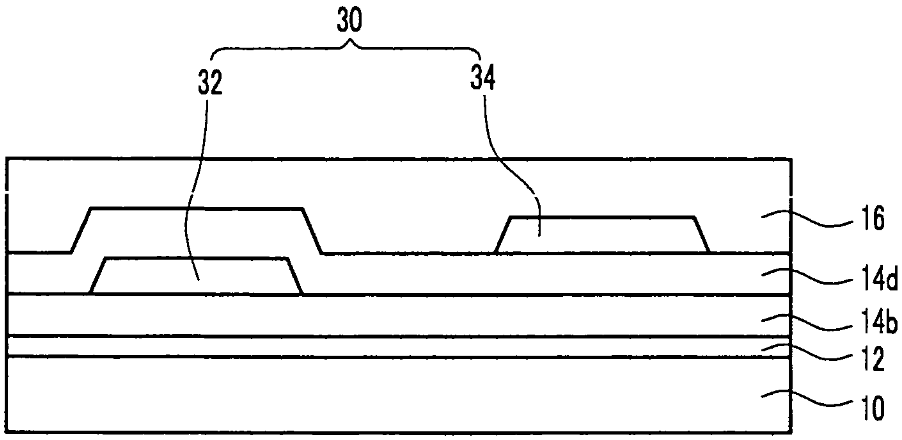
(54) Organic light emitting display

(57) An organic light emitting display is provided. In the organic light emitting display, when a wiring section (30) including a plurality of signal lines (32,34) for transmitting signals to a driving circuit unit or an organic light emitting device is formed under a non-display region, more specifically, a COG region where a driving IC is mounted, the signal lines (32,34) of the wiring section (30) are disposed on two or more different layers (14b, 14d) to maintain a height difference between neighboring signal lines (32,34) for transmitting different signals from each other.

FIG.3



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an organic light emitting display, and more particularly, to an organic light emitting display in which signal lines disposed under a non-display region located out of a display region where an image is displayed, more specifically, a chip on glass (COG) region are prevented from being shorted.

Description of the Related Art

[0002] Recently, various flat displays capable of reducing weight and volume in comparison to cathode ray tube (CRT) displays have been developed.

[0003] Typically, a flat display device includes a liquid crystal display (LCD), a field emission display (FED), a plasma display panel (PDP), an organic light emitting display (OLED), and the like.

[0004] An organic light emitting display displays an image by driving N x M organic light emitting devices, which are emissive display elements for electrically exciting an organic compound to emit light, by using a voltage or current.

[0005] Since an organic light emitting device has diode characteristics, an organic light emitting device may also be referred to as an organic light emitting diode. An organic light emitting device includes an anode electrode that is a hole injection electrode, an organic thin film that is a light emitting layer, and a cathode electrode that is an electron injection electrode.

[0006] Accordingly, when holes and electrons are injected into the organic thin film, exitons obtained by combining the injected holes and electrons are transitioned from an excited state to a ground state and light is emitted from the organic light emitting device.

[0007] OLEDs including an organic light emitting device having the aforementioned structure can be classified into a passive matrix type OLED and an active matrix type OLED depending upon the driving type.

[0008] The structure of an active matrix type OLED will be described in detail.

[0009] An active matrix type OLED includes a first substrate provided with organic light emitting devices.

[0010] Here, the first substrate may be a driving circuit substrate including a driving circuit unit provided with TFTs.

[0011] The first substrate may be a display substrate not provided with the driving circuit unit, hereinafter, it is assumed that the first substrate is the driving circuit substrate.

[0012] The first substrate includes a display region, which is provided with organic light emitting devices, for displaying a predetermined image and a non-display region located outside the display region.

[0013] The display region is provided with a lower structure. A flattening layer is formed on the lower structure.

[0014] Here, the lower structure includes a plurality of thin film transistors and an interlayer insulation film for insulating the gate electrodes of the thin film transistors from the source and drain electrodes thereof.

[0015] In addition, an anode electrode electrically connected to the source and/or drain electrodes is formed on the flattening layer. The light emitting layer and a cathode electrode are sequentially formed on the anode electrode.

[0016] The organic light emitting device including the anode electrode, the light emitting layer, and the cathode electrode is separated from a neighboring sub-pixel by using a pixel defining layer.

[0017] The sub-pixel generally includes the light emitting layer for emitting red, green, or blue light.

[0018] Accordingly, a single pixel includes three sub-pixels for emitting light of each color of R, G and B. Full colors can be displayed by using a plurality of pixel.

[0019] The aforementioned organic light emitting display includes one or more driving ICs.

[0020] The driving ICs may be generally mounted by a tape automated bonding (TAB) or by a chip on glass (COG) method.

[0021] Here, the TAB method is a technique of mounting a tape carrier package (TCP) in which the driving IC is mounted, on the substrate, and the COG method is a technique of directly mounting the driving IC on the substrate.

[0022] In the COG method, a driving IC having a finer pitch can be mounted as compared with a pitch used for the TAB method. Accordingly, recently, the COG method has been widely used.

[0023] However, to apply the COG method, the COG region on which the driving IC is mounted has to be included on the substrate. In the past, a part of the non-display region disposed outside of the display region was used as the COG region.

[0024] Recently, a multi-panel process has been used to manufacture the organic light emitting display having the aforementioned structure.

[0025] Here, in the multi-panel process, a plurality of organic light emitting displays are formed on a mother glass, all the organic light emitting displays are enclosed by using encapsulation glass, and the encapsulation glass and the mother glass are cut in units of displays to provide a plurality of displays.

[0026] When the COG type organic light emitting display is manufactured in the multi-panel process, a part of the encapsulation glass is scribed and removed to expose the COG region, and the driving IC is mounted on the exposed COG region.

[0027] However, when the part of the encapsulation glass is removed, the flattening film is scratched by glass particles generated in the scribing process.

[0028] Accordingly, wirings under the COG region, which are formed on the same layer as the source and drain electrodes of the thin film transistor and protected by the flattening film, are shorted in the process of fabrication.

SUMMARY OF THE INVENTION

[0029] The present invention sets out to provide an organic light emitting display capable of preventing wires disposed on a non-display region from being shorted.

[0030] According to a first aspect of the invention there is provided an organic light emitting display device as set out in claim 1. Preferred features are set out in claims 2 to 18. Different signals may be transmitted through the first and second signal lines, respectively.

[0031] In addition, the same signals may be transmitted through the first signal lines, and similarly, the same signals may be transmitted through the second signal lines.

[0032] According to a second aspect of the invention there is provided a method of fabricating an organic light emitting display device as set out in claim 19. Preferred features are set out in claims 20 and 21.

[0033] In the organic light emitting display having the aforementioned structure, the signal lines are prevented from being shorted. Accordingly, serious errors are prevented from occurring in driving the organic light emitting devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

FIG. 1 is a top plan view illustrating a schematic structure of an organic light emitting display according to an embodiment of the present invention;

FIG. 2 is a cross-sectional view illustrating a schematic structure of a display region shown in FIG. 1;

FIG. 3 is a cross-sectional view illustrating a schematic structure of a wiring section disposed under a non-display region shown in FIG. 1, more specifically, a COG region; and

FIG. 4 is a cross-sectional view illustrating a schematic structure of a wiring section according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0035] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred 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.

[0036] Like reference numerals designate like elements throughout the specification.

[0037] In the drawings, the thickness of layers, films, panels, regions, etc. are exaggerated for clarity. 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.

[0038] In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present.

[0039] As shown in FIG. 1, the organic light emitting display according to an embodiment of the present invention includes first and second substrates 10 and 20 facing each other.

[0040] Here, the first substrate 10 may be made of transparent glass, opaque resin, or metal foil.

[0041] The second substrate 20 enclosed in the first substrate 10 by using a sealant may be made of transparent glass or metal cap.

[0042] The aforementioned structure may be sealed by coating the structure of the first substrate 10 with a thin film.

[0043] The first substrate 10 includes a display region A1 and a non-display region A2. The display region A1 is provided with a plurality of organic light emitting devices 18 for displaying a predetermined image.

[0044] Hereinafter, referring to FIG. 2, a cross sectional structure of the display region A1 is described.

[0045] FIG. 2 is a cross-sectional view illustrating an active matrix type organic light emitting display serving as a bottom emission type device. A buffer film 12 is formed on the first substrate 10, and thin film transistors 14 constituting a driving circuit unit are formed on the buffer film 12.

[0046] More specifically, a semiconductor layer 14a is formed on the buffer layer 12, and a gate insulation film 14b is formed on the semiconductor layer 14a and the buffer layer 12.

[0047] Here, the semiconductor 14a is formed by patterning a polycrystalline silicon film into a predetermined shape and injecting impurities into the polycrystalline silicon film to form source and drain regions and a channel region interposed therebetween.

[0048] A gate electrode 14c is formed on the gate insulation film 14b, an interlayer insulation film 14d is formed on the gate electrode 14c and the gate insulation film 14b, and source and drain electrodes 14e and 14f are formed on the interlayer insulation film 14d.

[0049] The source and drain electrodes 14e and 14f are electrically connected to the source and drain regions of the semiconductor layer 14a, respectively, through a connection hole of the interlayer insulation film 14d.

[0050] A flattening layer 16 is formed on the thin film transistor 14 and the interlayer insulation film 14d, and an organic light emitting device 18 is formed on the flattening layer 16.

[0051] More specifically, an anode electrode 18a is formed on the flattening layer 16. The anode electrode 18a is electrically connected to the drain electrode 14f through a connection hole of the flattening layer 16. A light emitting layer 18b and a cathode electrode 18c are sequentially formed on the anode electrode 18a.

[0052] The anode electrode 18a may be made of a transparent conductive material such as ITO or IZO to display light emitted from the light emitting layer 18b to the outside of the organic light emitting devices 18 through the anode electrode 18a and the first substrate 10.

[0053] The organic light emitting devices 18 including the anode and cathode electrodes 18a and 18c and the light emitting layer 18b are separated from neighboring elements by a pixel defining layer 18d.

[0054] The light emitting layer 18b may be constructed as a multilayer structure including a hole injection layer, a hole transport layer, and an electron transport layer to display one color of red, green, and blue.

[0055] Although not shown, an electron injection layer (EIL) may be further formed between the electron transport layer and the cathode electrode 18c.

[0056] The organic light emitting devices 18 having the aforementioned structure display a predetermined image by allowing the light emitted from the light emitting layer 18b to pass through the anode electrode 18a and the first substrate 10 and to be emitted to the outside of the organic light emitting devices 18.

[0057] A detailed structure of the aforementioned organic light emitting device and the thin film transistor may be changed according to a product specification.

[0058] The non-display region A2 disposed outside of the display region A1 includes a wiring section 30 for supplying a driving signal to the thin film transistor 14 or organic light emitting device 18.

[0059] As shown in FIG. 3, the wiring section 30 includes a plurality of signal lines 32 and 34. The driving signal is transmitted through the signal lines 32 and 34.

[0060] However, in prior devices, the signal lines 32 and 34, which are made of the same material as the source and drain electrodes 14e and 14f, have been formed on the interlayer insulation film 16.

[0061] Accordingly, when the non-display region that is not enclosed by the second substrate 20, is scratched in the process of fabrication, a short circuit occurs between the signal lines 32 and 34.

[0062] In the present embodiment, to prevent the short circuit between the signal lines 32 and 34, at least one signal line of the signal lines 32 and 34 is formed on the gate insulation film 14b.

[0063] More specifically, the wiring section 30 according to an embodiment of the present invention includes a first signal line 32 formed on the gate insulation film 14b and a second signal line 34 formed on the interlayer insulation film 14d.

[0064] Although one first signal line 32 and one second signal line 34 are shown in FIG. 3, a plurality of first signal lines 32 and a plurality of second signal lines 34 are formed under the COG region A3 in the same pattern as FIG. 3, in practice.

[0065] The first signal line 32 may be made of the same material as the gate electrode 14c. The second signal line 34 may be made of the same material as the source and drain electrodes 14e and 14f.

[0066] When the wiring section 30 having the aforementioned structure is formed, the first signal line 32 formed on the gate insulation film 14b and the second signal line 34 formed on the interlayer insulation film 14d may be alternately disposed.

[0067] That is, the first and second signal lines 32 and 34 may be disposed on different layers to maintain a height difference between the neighboring signal lines.

[0068] This is because the short circuit between the neighboring signal lines 32 and 34 can be thereby prevented. The wiring section 30 having the aforementioned structure is constructed so that different signals are transmitted through the first and second signal lines 32 and 34, respectively.

[0069] In this case, the same signals or different signals may be transmitted through the aforementioned first signal lines 32, and the same signals may be transmitted through the second signal lines 34.

[0070] The first and second signal lines 32 and 34 need not be alternately formed one by one.

[0071] For example, two or more first signal lines 32 protected by the interlayer insulation film 14d may be formed between the second signal lines 34.

[0072] On the other hand, in another embodiment of the present invention, as shown in FIG. 4, all the signal lines constituting the wiring section 30, that is, the first and second signal lines 32 and 34 are made of the same material as the gate electrode 14c and formed on the gate insulation film 14b.

[0073] In the present embodiment, two or more different voltages are transmitted through the signal lines 32 and 34.

[0074] While this invention 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. An organic light emitting display device comprising:

a first substrate comprising a top surface;
a second substrate;
an array of organic light emitting pixels interposed between the first substrate and the second substrate;
a thin film transistor interposed between the first substrate and the array of organic light emitting

pixels, the thin film transistor comprising a semiconductor layer, a gate electrode, a source electrode and a drain electrode, a gate insulation layer arranged between the semi-conductor layer and the gate electrode, and an interlayer insulation layer arranged between the gate electrode and the source and drain electrodes; and a plurality of conductive lines comprising first conductive lines and second conductive lines, wherein the first conductive lines are formed on the gate insulation layer and the second conductive lines are formed on one of the gate insulation layer or the interlayer insulation layer.

2. A device according to claim 1 wherein the second conductive lines are formed on the gate insulation layer.

3. A device according to claim 1 wherein the second conductive lines are formed on the interlayer insulation layer.

4. A device according to any one of claims 1 to 3, further comprising a chip on glass (COG) region which does not overlap the array of organic light emitting pixels, wherein the first and second conductive lines are disposed in the COG region.

5. A device according to any one of claims 1 to 4, wherein the gate insulation layer comprises a first extension, and wherein the first conductive lines are interposed between the first extension of the gate insulation layer and the interlayer insulation layer.

6. A device according to any preceding Claim, wherein the first conductive lines are made of the same material as the gate electrode.

7. A device according to any one of Claims 3 to 6, wherein the interlayer insulation layer comprises a second extension, and wherein the second conductive lines are interposed between the second extension of the interlayer insulation layer and the array of organic light emitting pixels.

8. A device according to any preceding Claim, wherein the second conductive lines are made of the same material as the source and drain electrodes.

9. A device according to any preceding Claim, wherein the first conductive lines and the second conductive lines are disposed in an alternating order along a direction substantially parallel to the top surface.

10. A device according to any preceding Claim, wherein signals transmitted through the first conductive lines are different from signals transmitted through the second conductive lines.

11. A device according to any preceding Claim, wherein the array of organic light emitting pixels defines a display region confined by the first and second substrates along a first direction substantially perpendicular to the top surface and by a perimeter surface along a second direction substantially parallel to the top surface, wherein the perimeter surface is extended between the first and second substrate and perpendicular to the top surface.

12. A device according to Claim 11, wherein the array of organic light emitting pixels is provided in the display region, and wherein the thin film transistor is provided in the display region.

13. A device according to Claim 11 or 12, wherein the plurality of conductive lines are provided in a non-display region, wherein the non-display region comprises a region between the first and second substrates, and wherein the non-display region encloses the perimeter surface of the display region.

14. The device of Claim 13. wherein the non-display region further comprises a chip on glass (COG) region, wherein the plurality of conductive lines are formed in the COG region.

15. A device according to any preceding Claim, wherein the first and second conductive lines are substantially parallel to one another and not overlapping when viewed in a direction substantially perpendicular to the top surface.

16. An organic light emitting display device according to Claim 1,
wherein the first and second conductive lines are formed on a first extension of the gate insulation layer, and wherein the first extension is extended from the gate insulation layer of the thin film transistor.

17. A device according to Claim 15, wherein the first and second conductive lines are interposed between the first extension of the gate insulation layer and a second extension of the interlayer insulation layer.

18. A device according to any preceding Claim, wherein the first and second conductive lines are for transmitting signals to the thin film transistor.

19. A method of fabricating an organic light emitting display device, the method comprising:

forming a semiconductor layer on a first substrate;
forming a gate insulation layer on the semiconductor layer;
forming a gate electrode and first conductive lines on the gate insulation layer;

forming an interlayer insulation layer on the gate electrode and the first conductive lines;
forming source and drain electrodes on the interlayer insulation layer;
forming a flattening layer on the source and drain electrodes; and
forming an array of organic light emitting pixels on the flattening layer.

20. A method according to claim 19 further comprising forming second conductive lines on the interlayer insulation layer and wherein the flattening layer is formed on the second conductive lines.

21. A method according to claim 19 further comprising forming second conductive lines on the gate insulation layer.

FIG.1

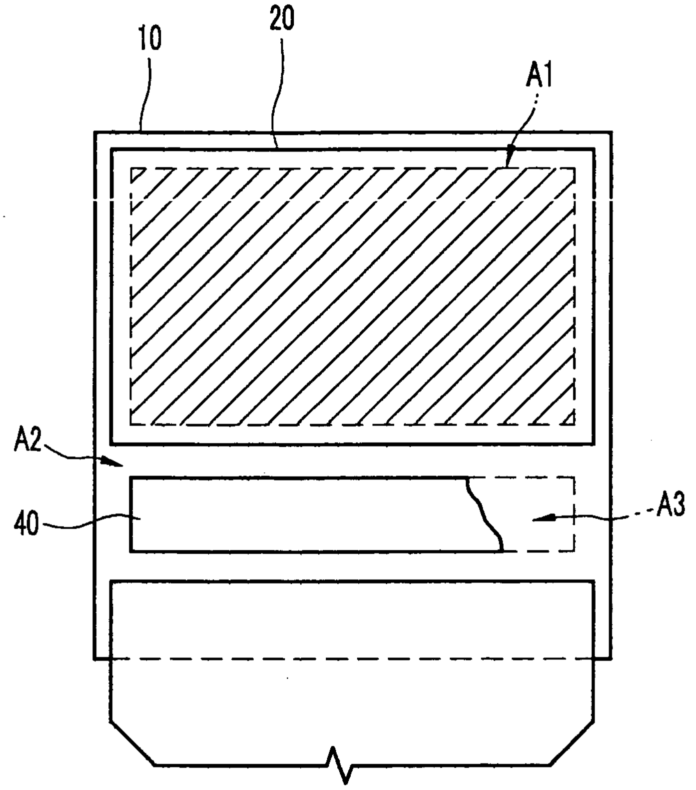

10
20
A1
A2
40
A3

FIG.2

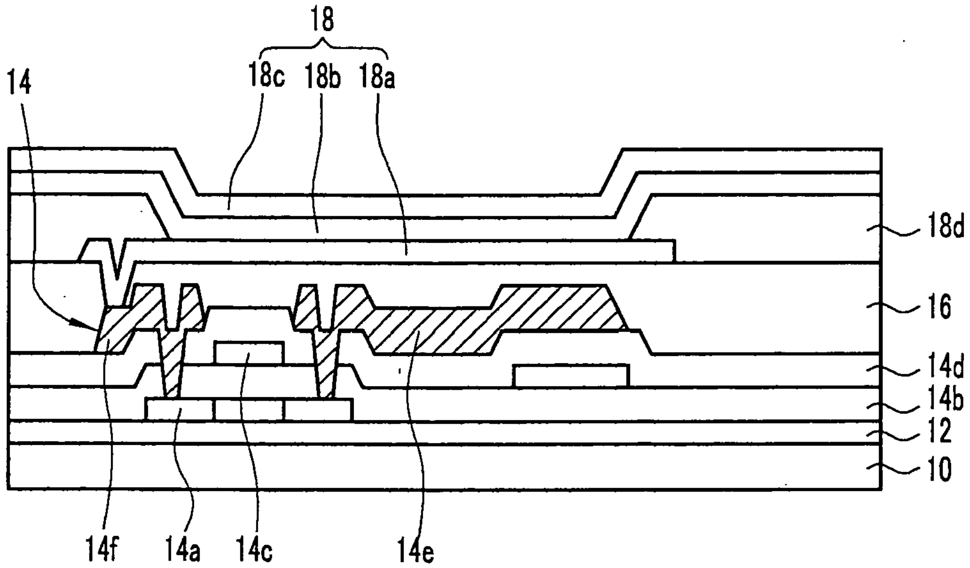

18
18c
18b
18a
14
18d
16
14d
14b
12
10
14f
14a
14c
14e

FIG.3

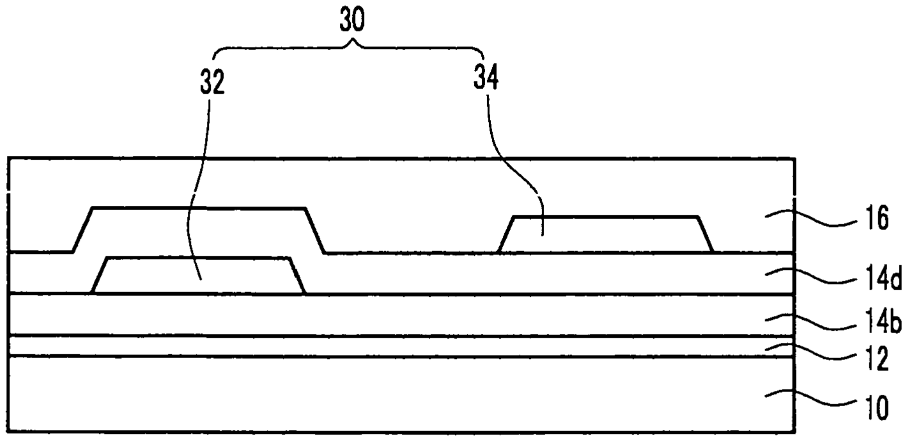
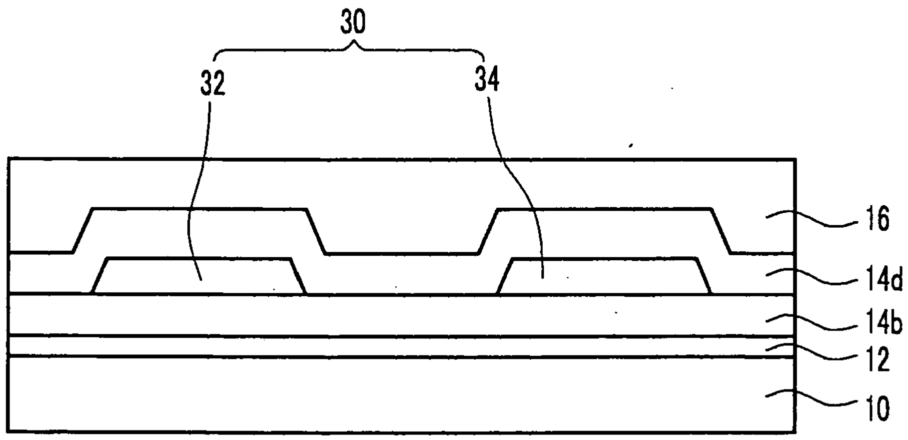


FIG.4



专利名称(译)	有机发光显示器		
公开(公告)号	EP1895593A2	公开(公告)日	2008-03-05
申请号	EP2007253445	申请日	2007-08-31
[标]申请(专利权)人(译)	三星斯笛爱股份有限公司		
申请(专利权)人(译)	三星SDI CO.，LTD.		
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外部链接	Espacenet		

摘要(译)

提供一种有机发光显示器。在有机发光显示器中，当包括用于将信号传输到驱动电路单元或有机发光器件的多条信号线（32,34）的布线部分（30）形成在非显示区域下时，更具体地，安装驱动IC的COG区域，布线部分（30）的信号线（32,34）设置在两个或更多个不同的层（14b，14d）上，以保持相邻信号线（32）之间的高度差，34）用于彼此传输不同的信号。

FIG.3