

(19)



(11)

EP 2 421 042 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
06.05.2020 Bulletin 2020/19

(51) Int Cl.:
H01L 27/32^(2006.01) H01L 51/52^(2006.01)

(21) Application number: **11151523.5**

(22) Date of filing: **20.01.2011**

(54) Organic light emitting display and method of manufacturing the same

Organische lichtemittierende Anzeige und Verfahren zu ihrer Herstellung

Affichage électroluminescent organique et son procédé de fabrication

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **20.08.2010 KR 20100080850**

(43) Date of publication of application:
22.02.2012 Bulletin 2012/08

(73) Proprietor: **Samsung Display Co., Ltd. Gyeonggi-do (KR)**

(72) Inventors:
• **Ko, Chun-Seok Gyeonggi-do (KR)**

• **Lee, Jang-Doo Gyeonggi-do (KR)**

(74) Representative: **Gulde & Partner Patent- und Rechtsanwaltskanzlei mbB Wallstraße 58/59 10179 Berlin (DE)**

(56) References cited:
EP-A2- 2 081 178 US-A1- 2003 102 424
US-A1- 2004 170 927 US-A1- 2005 139 841
US-A1- 2006 192 496 US-A1- 2007 134 830
US-A1- 2007 278 952

EP 2 421 042 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to an organic light emitting display and a method of manufacturing the same.

Description of the Related Art

[0002] Among flat panel displays (FPDs), the organic light emitting displays display images using organic light emitting diodes (OLEDs) that generate light by a recombination of electrons and holes. The organic light emitting display has high response speed and is driven with low power consumption and thus has been spotlighted as a next generation display.

[0003] In general, an OLED display includes a display unit having a plurality of pixels, driving circuits for supplying driving signals to the display unit, and a pixel power source for supplying a pixel power to the display unit.

[0004] The pixels are synchronized with scan signals when the scan signals are supplied to emit light having brightness corresponding to supplied data signals so that the display unit displays an image (e.g., a predetermined image).

[0005] In an organic light emitting display, the emission brightness of the pixels are affected by the voltage of the pixel power. That is, the pixel power determines the emission brightness together with the data signals.

[0006] Therefore, in order to display an image with a more uniform picture quality, the pixel power having a more uniform or the same voltage can be supplied to the pixels.

[0007] However, the pixel power source typically is a direct current (DC) power source having a voltage level (e.g., a predetermined voltage level) and an IR drop (e.g., a voltage drop) is generated while passing through a power source line (e.g., while the voltage passes through a power source line).

[0008] In particular, as the size of the display panel of the organic light emitting display increases, the length of the power source line increases so that the variation in the brightness of the pixels increases in accordance with the distance between the pixel power source and a power source pad that receives a pixel power from the pixel power source.

[0009] EP 2081178 A2, US 2007/0134830 A1, US 2005/0139841 A1, and US 2007/0278952 A1 disclose exemplary embodiments of an organic light emitting display comprising an organic light emitting display panel with a display unit. A plurality of pixel power source out lead bonding (OLB) pads is located on external side edges of the display unit. A plurality of pixel power source lines is coupled to the pixel power source OLB pads. A plurality of pixel power source flexible printed circuit boards (FPCBs) is bonded to the pixel power source OLB pads. A plurality of signal OLB pads is located on at least one external side edge. A plurality of signal lines is coupled to the signal OLB pads and a plurality of tape carrier

packages (TCPs) is mounted with driving ICs and bonded to the signal OLB pads. The signal OLB pads and the pixel power source OLB pads may be located on a same external side edge.

SUMMARY

[0010] Accordingly, aspects of embodiments of the present invention are directed to an organic light emitting display in which flexible printed circuit boards (FPCB) for supplying pixel power are attached on the external side edges of a display unit to apply the pixel power to the four edges of the display unit and to reduce or minimize the IR drop of the pixel power supplied to the display unit.

[0011] Aspects of embodiments of the present invention are also directed to an organic light emitting display in which signal out lead bonding (OLB) pads electrically coupled to a driving IC and pixel power source OLB pads electrically coupled to a pixel power source are formed in separate regions on the external side edge among the external side edges of the display unit where a tape carrier package (TCP) mounted with the driving IC is attached so that large hot bars may be used when the TCP and the flexible printed circuit boards (FPCBs) for supplying the pixel power are bonded to the display to improve manufacturing process yield and tact time and a method of manufacturing the same.

[0012] According to the present invention, there is provided an organic light emitting display as defined in claim 1. The organic light emitting display includes an organic light emitting display panel including a display unit, a plurality of pixel power source out lead bonding (OLB) pads located on first, second, third, and fourth external side edges of the display unit to supply a pixel power to the display unit, a plurality of pixel power source lines coupled to the pixel power source OLB pads to provide the pixel power to the display unit, a plurality of pixel power source flexible printed circuit boards (FPCBs) bonded to the pixel power source OLB pads, a plurality of signal OLB pads located on at least one external side edge among the first, second, third, and fourth external side edges to supply a plurality of driving signals to the display unit, a plurality of signal lines coupled to the signal OLB pads to provide the driving signals to the display unit, and a plurality of tape carrier packages (TCPs) mounted with driving ICs and bonded to the signal OLB pads. The signal OLB pads and the pixel power source OLB pads are located on a same external side edge. The organic light emitting display is characterized in that the signal OLB pads bonded to the TCPs are arranged along a first line, the first line being at a first distance from the display unit, and the pixel power source OLB pads bonded to the pixel power source FPCBs are arranged along a second line, the second line being at a second distance from the display unit, wherein the first line is located closer to the display unit than the second line. The signal OLB pads and the pixel power source OLB pads are respectively located in a first region and a second region that are

laterally separated from each other in a direction of the first and second lines.

[0013] The pixel power may include at least one of a first pixel power or a second pixel power. The driving signals may be scan signals and/or data signals.

[0014] Each of the TCPs may include a base film, a plurality of driving ICs mounted on the base film, and a plurality of line patterns formed on the base film and electrically coupled to the signal OLB pads.

[0015] According to another embodiment of the present invention, there is provided a method of manufacturing an organic light emitting display as defined in claim 4. The method includes bonding a plurality of tape carrier packages (TCPs) mounted with a plurality of driving ICs to a plurality of signal out lead bonding (OLB) pads located in at least one side edge among a plurality of external side edges of an organic light emitting display panel including a display unit, and bonding a plurality of pixel power source flexible printed circuit boards (FPCBs) to a plurality of pixel power source out lead bonding (OLB) pads located on each of the external side edges of the organic light emitting display panel. The signal OLB pads and the pixel power source OLB pads are located on a same external side edge. The organic light emitting display is characterized in that the signal OLB pads bonded to the TCPs are arranged along a first line, the first line being at a first distance from the display unit, and the pixel power source OLB pads bonded to the pixel power source FPCBs are arranged along a second line, the second line being at a second distance from the display unit, wherein the first line is located closer to the display unit than the second line. The signal OLB pads and the pixel power source OLB pads are respectively located in a first region and a second region that are laterally separated from each other in a direction of the first and second lines.

[0016] The TCPs may be bonded by positioning one end of each of the TCPs to overlap a signal out lead bonding (OLB) bonding pad located in the first region, interposing an anisotropic conductive film (ACF) between the TCPs and the signal OLB pads, and applying heat and pressure using hot bars.

[0017] The pixel power source FPCBs bonded to the same external side edge together with the TCPs may be bonded by positioning one end of each of the FPCBs to overlap a pixel power source out lead bonding (OLB) pad located in the second region, by interposing an anisotropic conductive film (ACF) between the FPCBs and a plurality of signal OLB pads, and applying heat and pressure using hot bars.

[0018] As described above, according to embodiments of the present invention, the FPCBs for supplying the pixel power source are attached onto the external side edges of the display unit so that the pixel power is applied to the four edges of the display unit through the FPCBs and that the IR drop of the pixel power supplied to the display unit is reduced or minimized.

[0019] In addition, on the external side edge where the TCP mounted with the driving IC is attached among the

external side edges of the display unit, the signal OLB pads electrically coupled to the driving IC and the plurality of pixel power source OLB pads electrically coupled to the pixel power source are formed in separate regions. Bonding the TCP and bonding the FPCBs for supplying the pixel power are separated so that bonding defect may be recovered or reduced although large hot bars may be used and that manufacturing process yield and tact time may be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings, together with the specification, illustrate exemplary embodiments of the present invention, and, together with the description, serve to explain the principles of the present invention.

[0021] FIG. 1 is a block diagram illustrating an example of an organic light emitting display according to one embodiment of the present invention;

[0022] FIG. 2 is a circuit diagram illustrating an example of a pixel which may be used with the display of FIG. 1;

[0023] FIG. 3 is an exploded perspective view of an organic light emitting display panel according to one embodiment of the present invention; and

[0024] FIG. 4A and FIG. 4B illustrate a method of manufacturing an organic light emitting display according to one embodiment of the present invention.

DETAILED DESCRIPTION

[0025] Hereinafter, certain exemplary embodiments according to the present invention will be described with reference to the accompanying drawings. Here, when a first element is described as being coupled to a second element, the first element may be directly coupled to the second element or may be indirectly coupled to the second element via a third element. Further, some of the elements that are not essential to the complete understanding of the invention are omitted for clarity. Also, like reference numerals refer to like elements throughout.

[0026] Hereinafter, an embodiment of the present invention will be described in detail with reference to the accompanying drawings.

[0027] FIG. 1 is a block diagram illustrating an organic light emitting display according to one embodiment of the present invention.

[0028] Referring to FIG. 1, according to one embodiment of the present invention, an organic light emitting display 100 includes a scan driver 110, a data driver 120, a timing controller 140, a display unit 150, and a power source supply 130.

[0029] The scan driver 110 generates scan signals in accordance with scan driving control signals SCS supplied from the timing controller 140. The scan signals generated by the scan driver 110 are sequentially supplied to scan lines S1 to Sn.

[0030] The data driver 120 generates data signals in accordance with data Data and the data driving control

signals DCS supplied from the timing controller 140. The data signals generated by the data driver 120 are supplied to data lines D1 to Dm in synchronization with the scan signals.

[0031] The timing controller 140 generates the scan driving control signals SCS and the data driving control signals DCS in accordance with synchronizing signals supplied from the outside. The scan driving control signals SCS generated by the timing controller 140 are supplied to the scan driver 110 and the data driving control signals DCS are supplied to the data driver 120. In addition, the timing controller 140 transmits the data Data supplied from the outside to the data driver 120.

[0032] The display unit 150 includes a plurality of pixels 160 formed at crossing regions of the scan lines S1 to Sn and the data lines D1 to Dm. The display unit 150 displays an image in accordance with the scan signals supplied from the scan driver 110 and the data signals supplied from the data driver 120.

[0033] The power source supply 130 generates a first pixel power ELVDD and a second pixel power ELVSS using an external power supplied from an external power source supply apparatus (not shown). The power source supply 130 supplies the generated first and second pixel powers ELVDD and ELVSS to the display unit 150.

[0034] In the organic light emitting display 100, the display unit 150 is formed in the organic light emitting display panel.

[0035] The scan driver 110 and/or the data driver 120 is directly mounted in the organic light emitting display or is electrically coupled to the scan lines and/or the data lines, respectively, formed in the display unit 150 through a tape carrier package (TCP).

[0036] The TCP includes a base film and a driver IC mounted on the base film and is bonded to out lead bonding (OLB) pads provided on one end of each of the scan lines and/or the data lines. The bonding of the TCP may be formed by heat and pressure using a hot bar.

[0037] The power source supply 130 and/or the timing controller 140 is mounted on a driving board outside an organic light emitting display panel to be coupled to an organic light emitting display panel through a flexible printed circuit board (FPCB).

[0038] The FPCB may be coupled to the organic light emitting display panel by OLB bonding using the hot bar as described above.

[0039] FIG. 2 is a circuit diagram illustrating a pixel which may be used with the display of FIG. 1. For the sake of convenience, in FIG. 2, a pixel 160 of the display unit 150 coupled to the nth scan line Sn and the mth data line Dm will be described.

[0040] Referring to FIG. 2, a pixel 160 includes an organic light emitting diode (OLED), a scan line Sn, a data line Dm, a first pixel power source for supplying the first pixel power ELVDD, and a pixel circuit 162 coupled to the OLED.

[0041] The anode electrode of the OLED is coupled to the pixel circuit 162 and the cathode electrode of the

OLED is coupled to a second pixel power source for supplying the second pixel power ELVSS. The OLED emits light having brightness in accordance with the amount of current supplied from the pixel circuit 162.

[0042] The pixel circuit 162 includes a first transistor M1, a second transistor M2, and a storage capacitor Cst.

[0043] The first electrode of the first transistor M1 is coupled to the data line Dm and the second electrode of the first transistor M1 is coupled to a first node N1. The gate electrode of the first transistor M1 is coupled to the scan line Sn. The first transistor M1 is turned on when a scan signal is supplied to the scan line Sn to transmit a data signal supplied to the data line Dm to the first node N1.

[0044] The first electrode of the second transistor M2 is coupled to the first pixel power source for supplying the first pixel power ELVDD and the second electrode of the second transistor M2 is coupled to the anode electrode of the OLED. The gate electrode of the second transistor M2 is coupled to the first node N1. The second transistor M2 controls current that flows from the first pixel power source to the anode electrode of the OLED in accordance with the voltage supplied to the gate electrode of the second transistor M2.

[0045] One terminal of the storage capacitor Cst is coupled to the first node N1 and the other terminal of the storage capacitor Cst is coupled to the first pixel power source and the first electrode of the second transistor M2. The storage capacitor Cst stores the voltage corresponding to the data signal supplied to the first node N1 when the scan signal is supplied to the scan line Sn and maintains the stored voltage during one frame.

[0046] The operation processes of the pixel 160 will be described in more detail. First, when the scan signal is supplied to the scan line Sn, the first transistor M1 is turned on. When the first transistor M1 is turned on, the data signal supplied to the data line Dm is transmitted to the first node N1 via the first transistor M1. When the data signal is transmitted to the first node N1, the voltage corresponding to a difference between the voltage of the first pixel power ELVDD and the data signal is charged in the storage capacitor Cst. Then, the second transistor M2 controls the current that flows from the first pixel power source to the OLED in accordance with the voltage supplied to the gate electrode of the second transistor M2. The OLED emits light in accordance with the amount of current supplied thereto to display an image.

[0047] As described above, the pixel 160 emits light having a brightness in accordance with the amount of current supplied through the second transistor M2. The voltage of the first node N1, to which the gate electrode of the second transistor M2 is coupled, is sustained by the storage capacitor Cst during one frame.

[0048] The storage capacitor Cst stores a voltage corresponding to a difference between the voltage of the first pixel power ELVDD and a data signal while the data signal is supplied and maintains the voltage during one frame. Therefore, the emission brightness of the pixel

160 varies in accordance with the voltage of the first pixel power ELVDD and the data signal.

[0049] The voltage of the first pixel power ELVDD supplied to the pixels 160 may vary in accordance with the IR drop generated while the first pixel power ELVDD passes through a power source line. Therefore, the pixels 160 that receive the same data signal emit light with different brightness so that picture quality may deteriorate.

[0050] Therefore, aspects of embodiments of the present invention are directed to an apparatus for or a method of reducing or minimizing the IR drop of the first pixel power ELVDD.

[0051] FIG. 3 is an exploded perspective view of an organic light emitting display panel according to one embodiment of the present invention.

[0052] In FIG. 3, according to one embodiment of the present invention, a scan driver and/or a data driver are mounted in tape carrier packages (TCP) and the TCPs are attached to the same side edge of an organic light emitting display panel. However, embodiments of the present invention is not limited to the above.

[0053] For example, the TCP in which the scan driver is mounted and the TCP in which the data driver is mounted may be attached to different side edges of the organic light emitting display panel.

[0054] Referring to FIG. 3, an organic light emitting display panel 300 according to one embodiment of the present invention includes a display unit 310 positioned at the center, a plurality of pixel power source out lead bonding (OLB) pads 322 and 322' positioned on the first to fourth external side edges 300a to 300d of the display unit 310 to supply pixel power to the display unit 310, and pixel power source lines 320 and 320' coupled to the pixel power source OLB pads 322 and 322' to provide the pixel power to the display unit 310. The pixel power may be the first pixel power ELVDD and/or the second pixel power ELVSS.

[0055] In addition, the pixel power source OLB pads 322 and 322' are bonded to one side of each of the pixel power source FPCBs 330 and 330' and the pixel power is applied through a printed circuit board (PCB) bonded to the other sides of the pixel power source FPCBs 330 and 330'. In one embodiment, a power source supply (130 of FIG. 1) is mounted on the PCB.

[0056] Single or multiple layer line patterns 332 and 332' are formed in the pixel power source FPCBs 330 and 330'.

[0057] According to one embodiment of the present invention, organic light emitting display panel 300 further includes signal lines 340 positioned on one edge among the external side edges, for example, on the first external side edge 300a and coupled to a plurality of signal OLB pads 342 for supplying the scan signals and/or the data signals to the display unit 310 to provide the scan signals and/or the data signals to the display unit 310. The signal lines 340 may be scan lines or data lines.

[0058] The signal OLB pads 342 are bonded to one side of each of the TCPs 350. The scan lines and/or the

data signals are applied through the PCB bonded to the other sides of the TCPs 350. In one embodiment of the present invention, a timing controller (140 of FIG. 1) is mounted on the PCB.

[0059] According to one embodiment of the present invention, the TCP 350 includes a base film 351, a driving IC 354 mounted on the base film 351, and a plurality of line patterns 352.

[0060] In addition, the display unit 310 includes a plurality of pixels. The display unit 310 displays images in accordance with the scan signals and the data signals supplied through the signal OLB pads 342 and the pixel power (e.g., ELVDD or ELVSS) supplied through the pixel power source OLB pads 322 and 322'.

[0061] As described above, due to the IR drop generated when the pixel power passes through the power source line formed in the display unit, the voltage of the first pixel power ELVDD supplied to the pixels 160 may vary so that pixels 160 that receive the same data signal may emit light having different brightness such that picture quality deteriorates.

[0062] In one embodiment of the present invention, as illustrated in FIG. 3 and as described above, the pixel power source FPCBs 330 and 330' are attached on the external side edges of the display unit 310 so that the pixel power is applied to the four edges of the display unit 310 and that the IR drop of the pixel power source supplied to the display unit 310 may be reduced or minimized.

[0063] That is, in one embodiment of the present invention, the pixel power source OLB pads 322 and 322' of the organic light emitting display panel 300 are dispersed into the entire external regions (e.g., all four sides) of the display unit 310 so that the pixel power is supplied to the display unit 310 from upper and lower sides (or edges) and left and right sides (or edges) and that the IR drop of the pixel power source in the display unit 310 is reduced or minimized.

[0064] Therefore, although the size of the organic light emitting display panel 300 increases, an image with more uniform picture quality may be displayed. Therefore, the organic light emitting display may be applied to various display apparatuses such as a TV or an electronic display board so that organic light emitting displays may be more useful.

[0065] According to one embodiment of the present invention, the TCPs 350 mounted with the driving ICs are be bonded to the at least one side edge among the external side edges of the display unit 310. In one embodiment of the present invention, the TCPs 350 are positioned on the first external side edge 300a among the external side edges.

[0066] In this case, as illustrated in FIG. 3, the pixel power source FPCB 330' located on the first external side edge 300a is located between the TCPs 350 to be bonded.

[0067] According to one embodiment of the present invention, the pixel power source FPCB 330' and the

TCPs 350 formed on the first external side edge 300a are bonded using a hot bar through heat and pressure.

[0068] One end of each of the pixel power source FPCB 330' and the TCPs 350 formed on the first external side edge 300a is positioned to overlap the pixel power source OLB bonding pad 322' and the signal OLB bonding pads 342, respectively, of the panel and an anisotropic conductive film (ACF) is interposed between the pixel power source OLB bonding pad 322' and the signal OLB bonding pad 342. Then, heat and pressure are applied using the hot bar so that bonding is performed.

[0069] However, in general, since the thickness h2 of the base films 351 of the TCPs 350 is smaller than the thickness h1 of the FPCB 330', if bonding is performed along the same line, an anisotropic conductive film (ACF) conductive ball on the side of the TCP 350 having a relatively small thickness does not properly burst so that a bonding defect may be generated. This bonding defect may deteriorate display picture quality.

[0070] In one embodiment of the present invention, the signal OLB pads 342 bonded to the TCPs 350 and the pixel power source OLB pads 322' bonded to the pixel power source FPCB 330' are formed in separate regions and bonding the TCPs 350 and bonding the pixel power source FPCB 330' are separated from each other so that the bonding defect may be recovered while using large hot bars and so that manufacturing process yield and tact time (or takt time) may be improved.

[0071] In addition, as illustrated in FIG. 3, in one embodiment of the present invention, the signal OLB pads 342 bonded to the TCPs 350 are arranged on a first line A, the OLB pads 322' bonded to the pixel power source FPCBs 330' are arranged in a second line B, and the first line A is positioned closer to the display unit 310 than the second line B.

[0072] When the TCPs 350 and the pixel power source FPCB 330' are bonded, the TCPs 350 are first bonded and the pixel power source FPCB 330' is bonded later so that a bonding defect due to the thickness h2 of the base films 351 of the TCPs 350 being smaller than the thickness h1 of the FPCB 330' may be reduced or solved.

[0073] Hereinafter, the manufacturing method of the organic light emitting display according to one embodiment of the present invention, that is, bonding the TCPs and the pixel power source FPCB will be described in more detail.

[0074] FIG. 4A and FIG. 4B illustrate a method of manufacturing an organic light emitting display according to one embodiment of the present invention.

[0075] The same components as FIG. 3 are denoted by the same reference numerals and detailed description thereof will be omitted.

[0076] First, referring to FIG. 4A, the TCPs 350 mounted with driving ICs 354 are bonded in a first region of at least one edge (e.g., the first external side edge 300a) among the external side edges of the organic light emitting display panel 300.

[0077] The first region corresponds to the first line A

to be adjacent to the display unit 310 and the signal OLB pads 342 bonded to the TCPs 350 are arranged in the first region, that is, on the first line A.

[0078] In addition, the TCPs 350 are bonded by a large hot bar 400 having a length corresponding to the longitudinal axis length of the organic light emitting display panel 300 as illustrated in FIG. 4A.

[0079] One end of each of the TCPs 350 formed on the first external side edge 300a is positioned to overlap the OLB bonding pad 342 arranged on the first line A and the ACF is interposed between the TCPs 350 and the OLB bonding pads 342. Then, heat and pressure are applied using the hot bar so that bonding is performed.

[0080] When bonding of the TCPs 350 is completed in the first region of the first external side edge 300a, as illustrated in FIG. 4B, the pixel power source FPCBs 330 and 330' are also bonded to the external side edges 300a, 300b, 300c, and 300d of the organic light emitting display panel 300.

[0081] The pixel power source FPCBs 330 and 330' are bonded by large hot bars 400 and 410 as described above.

[0082] That is, the pixel power source FPCBs 330 and 330' are bonded to the second and fourth external side edges 300b and 300d by the large hot bars 410 having lengths corresponding to the shorter length of the organic light emitting display panel 300 and are bonded to the first and third external side edges 300a and 300c by the large hot bars 400 having lengths corresponding to the longer length of the organic light emitting display panel 300.

[0083] The pixel power source FPCBs 330 and 330' are bonded to the first external side edge 300a in a second region different from the first region 300a in which the TCP 350 is bonded. The second region corresponds to the second line B, which is farther from the display unit 310 than the first line A.

[0084] In one embodiment of the present invention, the pixel power source OLB pads 322' bonded to the pixel power source FPCB 330' are arranged on the second line B.

[0085] One end of the pixel power source FPCB 330 formed on the side edges 300a, 300b, and 300c is positioned to overlap the pixel power source OLB pads 322 positioned on the ends of the side edges of the panel and the ACF is interposed between the pixel power source FPCB 330 and the pixel power source OLB pads 322. Then, heat and pressure are applied using the hot bars 400 and 410 so that bonding is performed.

[0086] One end of the pixel power source FPCB 330' formed on the first external side edge 300a is positioned to overlap the pixel power source OLB bonding pad 322' provided on the second line B and the ACF is interposed between the pixel power source FPCB 330' and the pixel power source OLB bonding pad 322'. Then, heat and pressure are applied using the hot bars 400 so that bonding is performed.

[0087] According to one embodiment of the present

invention, the signal OLB pads 342 and the pixel power source OLB pads 322' formed on the same external side edge are formed in separate regions, that is, the first region and the second region. Bonding the TCPs 350 and bonding the pixel power source FPCBs 330' are separated from each other so that bonding defect may be recovered while using large hot bars so that manufacturing process yield and tact time may be improved.

Claims

1. An organic light emitting display (300) comprising:

an organic light emitting display panel comprising a display unit (310);
 a plurality of pixel power source out lead bonding, OLB, pads (322) located on first, second, third, and fourth external side edges (300a...d) of the display unit;
 a plurality of pixel power source lines (320) coupled to the pixel power source OLB pads (322);
 a plurality of pixel power source flexible printed circuit boards, FPCBs, (330) bonded to the pixel power source OLB pads (322);
 a plurality of signal OLB pads (342) located on at least one external side edge among the first, second, third, and fourth external side edges (300a...d);
 a plurality of signal lines (340) coupled to the signal OLB pads (342); and
 a plurality of tape carrier packages, TCPs, (350) mounted with driving integrated circuits, ICs, (354) and bonded to the signal OLB pads (342), wherein the signal OLB pads (342) and the pixel power source OLB pads (322) are located on a same external side edge

characterised in that:

the signal OLB pads (342) bonded to the TCPs (350) are arranged along a first line (A), the first line (A) being at a first distance from the display unit (310), and the pixel power source OLB pads (322) bonded to the pixel power source FPCBs (330) are arranged along a second line (B), the second line (B) being at a second distance from the display unit (310), wherein the first line (A) is located closer to the display unit (310) than the second line (B)
 and wherein the signal OLB pads (342) and the pixel power source OLB pads (322) are respectively located in a first region and a second region that are laterally separated from each other in a direction of the first and second lines (A, B).

2. The organic light emitting display of claim 1, wherein

a pixel power comprises at least one of a first pixel power (ELVDD) or a second pixel power (ELVSS).

3. The organic light emitting display as claimed in any of the preceding claims, wherein each of the TCPs (350) comprises:

a base film (351);
 a plurality of driving ICs (354) mounted on the base film (351); and
 a plurality of line patterns (352) formed on the base film (351) and electrically coupled to the signal OLB pads (342).

4. A method of manufacturing the organic light emitting display (300) of claim 1 comprising:

bonding a plurality of tape carrier packages, TCPs, (350) mounted with a plurality of driving ICs (354) to a plurality of signal out lead bonding, OLB, pads (342) located in at least one side edge among a plurality of external side edges (300a...d) of an organic light emitting display panel comprising a display unit (310); and
 bonding a plurality of pixel power source flexible printed circuit boards, FPCBs, (330) to a plurality of pixel power source out lead bonding pads (322) located on each of the external side edges of the organic light emitting display panel, wherein the signal OLB pads (342) and the pixel power source OLB pads (322) are located on a same external side edge wherein
 the signal OLB pads (342) bonded to the TCPs (350) are arranged along a first line (A), the first line (A) being at a first distance from the display unit (310), and the pixel power source OLB pads (322) bonded to the pixel power source FPCBs (330) are arranged along a second line (B), the second line (B) being at a second distance from the display unit (310), wherein the first line (A) is located closer to the display unit (310) than the second line (B)
 and wherein the signal OLB pads (342) and the pixel power source OLB pads (322) are respectively located in a first region and a second region that are laterally separated from each other in a direction of the first and second lines (A, B).

5. The method of claim 4, wherein the TCPs (350) are bonded by positioning one end of each of the TCPs (350) to overlap the signal OLB pads (342), interposing an anisotropic conductive film between the TCPs (350) and the signal OLB pads (342), and applying heat and pressure using hot bars.

6. The method of claim 4 or 5, wherein the pixel power source FPCBs (330) bonded to the same external side edge together with the TCPs (350) are bonded

by positioning one end of each of the FPCBs (330) to overlap the pixel power source OLB pads (322), interposing an anisotropic conductive film between the FPCBs (330) and a plurality of pixel power source OLB pads (322), and applying heat and pressure using hot bars.

Patentansprüche

1. Organisches Licht emittierende Anzeige (300), umfassend:

ein organisches Licht emittierendes Anzeigefeld, das eine Anzeigeeinheit (310) umfasst; mehrere äußere Zuleitungspads, OLB-Pads, (322) der Pixelstromquelle, angeordnet an dem ersten, dem zweiten, dem dritten und dem vierten Außenseitenrand (300a...d) der Anzeigeeinheit;

mehrere Pixelstromquellenleitungen (320), die mit den OLB-Pads (322) der Pixelstromquelle gekoppelt sind;

mehrere flexible Leiterplatten, FPCBs, (330) der Pixelstromquelle, die mit den OLB-Pads (322) der Pixelstromquelle gebondet sind;

mehrere OLB-Signalpads (342), die an mindestens einem Außenseitenrand des ersten, des zweiten, des dritten und des vierten Außenseitenrands (300a...d) angeordnet sind;

mehrere Signalleitungen (340), die mit den OLB-Signalpads (342) gekoppelt sind; und mehrere Tape-Carrier-Packages, TCPs, (350), die mit integrierten Treiberschaltungen, Treiber-ICs, (354) montiert und mit den OLB-Signalpads (342) gebondet sind,

wobei die OLB-Signalpads (342) und die OLB-Pads (322) der Pixelstromquelle an einem gleichen Außenseitenrand angeordnet sind,

dadurch gekennzeichnet, dass

die mit den TCPs (350) gebondeten OLB-Signalpads (342) entlang einer ersten Linie (A) angeordnet sind, wobei die erste Linie (A) bei einem ersten Abstand von der Anzeigeeinheit (310) liegt, und die mit den FPCBs (330) der Pixelstromquelle gebondeten OLB-Pads (322) der Pixelstromquelle entlang einer zweiten Linie (B) angeordnet sind, wobei die zweite Linie (B) bei einem zweiten Abstand von der Anzeigeeinheit (310) liegt, wobei die erste Linie (A) sich näher zur Anzeigeeinheit (310) befindet als die zweite Linie (B),

und wobei die OLB-Signalpads (342) und die OLB-Pads (322) der Pixelstromquelle jeweils in einem ersten Bereich und einem zweiten Bereich angeordnet sind, die in einer Richtung der ersten und der zweiten Linie (A, B) lateral voneinander getrennt sind.

2. Organisches Licht emittierende Anzeige nach Anspruch 1, wobei ein Pixelstrom einen ersten Pixelstrom (ELVDD) und/oder einen zweiten Pixelstrom (ELVSS) umfasst.

3. Organisches Licht emittierende Anzeige nach einem der vorhergehenden Ansprüche, wobei jede der TCPs (350) Folgendes umfasst:

eine Trägerfolie (351); mehrere Treiber-ICs (354), die auf der Trägerfolie (351) montiert sind; und mehrere Leitungsmuster (352), die auf der Trägerfolie (351) ausgebildet und elektrisch mit den OLB-Signalpads (342) gekoppelt sind.

4. Verfahren zum Herstellen der organisches Licht emittierenden Anzeige (300) nach Anspruch 1, umfassend:

Bonden mehrerer Tape-Carrier-Packages, TCPs, (350), die mit mehreren Treiber-ICs (354) montiert sind, mit mehreren Äußere-Zuleitungssignalpads, OLB-Signalpads, (342), die an mindestens einem Seitenrand aus mehreren Außenseitenrändern (300a...d) eines eine Anzeigeeinheit (310) umfassenden, organisches Licht emittierenden Anzeigefelds angeordnet sind; und

Bonden mehrerer flexibler Leiterplatten, FPCBs, (330) der Pixelstromquelle mit mehreren äußeren Zuleitungspads (322) der Pixelstromquelle, die an jedem der Außenseitenränder des organisches Licht emittierenden Anzeigefelds angeordnet sind,

wobei die OLB-Signalpads (342) und die OLB-Pads (322) der Pixelstromquelle an einem gleichen Außenseitenrand angeordnet sind,

wobei die mit den TCPs (350) gebondeten OLB-Signalpads (342) entlang einer ersten Linie (A) angeordnet sind, wobei die erste Linie (A) bei einem ersten Abstand von der Anzeigeeinheit (310) liegt, und die mit den FPCBs (330) der Pixelstromquelle gebondeten OLB-Pads (322) der Pixelstromquelle entlang einer zweiten Linie (B) angeordnet sind, wobei die zweite Linie (B) bei einem zweiten Abstand von der Anzeigeeinheit (310) liegt, wobei die erste Linie (A) näher zur Anzeigeeinheit (310) angeordnet ist als die zweite Linie (B),

und wobei die OLB-Signalpads (342) und die OLB-Pads (322) der Pixelstromquelle jeweils in einem ersten Bereich und einem zweiten Bereich angeordnet sind, die in einer Richtung der ersten und der zweiten Linie (A, B) lateral voneinander getrennt sind.

5. Verfahren nach Anspruch 4, wobei die TCPs (350)

durch derartiges Positionieren eines Endes jeder der TCPs (350), dass es die OLB-Signalpads (342) überlappt, Einfügen eines anisotropen leitfähigen Films zwischen den TCPs (350) und den OLB-Signalpads (342) und Aufbringen von Wärme und Druck unter Verwendung von Thermoden gebondet sind.

6. Verfahren nach Anspruch 4 oder 5, wobei die FPCBs (330) der Pixelstromquelle, die zusammen mit den TCPs (350) an den gleichen Außenseitenrand gebondet sind, durch derartiges Positionieren eines Endes jeder der FPCBs (330), dass es die OLB-Pads (322) der Pixelstromquelle überlappt, Einfügen eines anisotropen leitfähigen Films zwischen den FPCBs (330) und mehreren der OLB-Pads (322) der Pixelstromquelle und Aufbringen von Wärme und Druck unter Verwendung von Thermoden gebondet sind.

Revendications

1. Dispositif d'affichage électroluminescent organique (300) comprenant :

un panneau d'affichage électroluminescent organique comprenant une unité d'affichage (310) ;

une pluralité de plots de liaison de conducteur de sortie, OLB, de source d'alimentation de pixel (322) situés sur des premier, deuxième, troisième et quatrième bords latéraux externes (300a...d) de l'unité d'affichage ;

une pluralité de lignes de source d'alimentation de pixel (320) couplées aux plots OLB de source d'alimentation de pixel (322) ;

une pluralité de cartes de circuit imprimé souples, FPCB, de source d'alimentation de pixel (330) reliées aux plots OLB de source d'alimentation de pixel (322) ;

une pluralité de plots OLB de signal (342) situés sur au moins un bord latéral externe parmi les premier, deuxième, troisième et quatrième bords latéraux externes (300a...d) ;

une pluralité de lignes de signal (340) couplées aux plots OLB de signal (342) ; et

une pluralité de boîtiers de support de bande, TCP, (350) montés avec des circuits intégrés, IC, d'attaque (354) et reliés aux plots OLB de signal (342),

dans lequel les plots OLB de signal (342) et les plots OLB de source d'alimentation de pixel (322) sont situés sur un même bord latéral externe

caractérisé en ce que :

les plots OLB de signal (342) reliés aux TCP (350) sont agencés le long d'une première

ligne (A), la première ligne (A) étant à une première distance de l'unité d'affichage (310), et les plots OLB de source d'alimentation de pixel (322) reliés aux FPCB de source d'alimentation de pixel (330) sont agencés le long d'une seconde ligne (B), la seconde ligne (B) étant à une seconde distance de l'unité d'affichage (310), où la première ligne (A) est située plus près de l'unité d'affichage (310) que la seconde ligne (B) et dans lequel les plots OLB de signal (342) et les plots OLB de source d'alimentation de pixel (322) sont respectivement situés dans une première région et une seconde région qui sont latéralement séparées l'une de l'autre dans une direction des première et seconde lignes (A, B) .

2. Dispositif d'affichage électroluminescent organique selon la revendication 1, dans lequel une alimentation de pixel comprend au moins l'une parmi une première alimentation de pixel (ELVDD) ou une seconde alimentation de pixel (ELVSS).

3. Dispositif d'affichage électroluminescent organique selon l'une quelconque des revendications précédentes, dans lequel chacun des TCP (350) comprend :

un film de base (351) ;

une pluralité d'IC d'attaque (354) montés sur le film de base (351) ; et

une pluralité de motifs de ligne (352) formés sur le film de base (351) et couplés électriquement aux plots OLB de signal (342).

4. Procédé de fabrication du dispositif d'affichage électroluminescent organique (300) selon la revendication 1, comprenant les étapes consistant à :

relier une pluralité de boîtiers de support de bande, TCP, (350) montés avec une pluralité d'IC d'attaque (354) à une pluralité de plots de liaison de conducteur de sortie, OLB, de signal (342) situés dans au moins un bord latéral parmi une pluralité de bords latéraux externes (300a...d) d'un panneau d'affichage électroluminescent organique comprenant une unité d'affichage (310) ; et

relier une pluralité de cartes de circuit imprimé souples, FPCB, de source d'alimentation de pixel (330) à une pluralité de plots de liaison de conducteur de sortie de source d'alimentation de pixel (322) situés sur chacun des bords latéraux externes du panneau d'affichage électroluminescent organique,

dans lequel les plots OLB de signal (342) et les plots OLB de source d'alimentation de pixel

(322) sont situés sur un même bord latéral externe dans lequel les plots OLB de signal (342) reliés aux TCP (350) sont agencés le long d'une première ligne (A), la première ligne (A) étant à une première distance de l'unité d'affichage (310), et les plots OLB de source d'alimentation de pixel (322) reliés aux FPCB de source d'alimentation de pixel (330) sont agencés le long d'une seconde ligne (B), la seconde ligne (B) étant à une seconde distance de l'unité d'affichage (310), où la première ligne (A) est située plus près de l'unité d'affichage (310) que la seconde ligne (B) et dans lequel les plots OLB de signal (342) et les plots OLB de source d'alimentation de pixel (322) sont respectivement situés dans une première région et une seconde région qui sont latéralement séparées l'une de l'autre dans une direction des première et seconde lignes (A, B).

5. Procédé selon la revendication 4, dans lequel les TCP (350) sont reliés par le positionnement d'une extrémité de chacun des TCP (350) de façon à chevaucher les plots OLB de signal (342), l'interposition d'un film conducteur anisotrope entre les TCP (350) et les plots OLB de signal (342), et l'application de chaleur et de pression à l'aide de barres chauffantes.
6. Procédé selon la revendication 4 ou 5, dans lequel les FPCB de source d'alimentation de pixel (330) reliées au même bord latéral externe conjointement avec les TCP (350) sont reliées par le positionnement d'une extrémité de chacune des FPCB (330) de façon à chevaucher les plots OLB de source d'alimentation de pixel (322), l'interposition d'un film conducteur anisotrope entre les FPCB (330) et une pluralité de plots OLB de source d'alimentation de pixel (322), et l'application de chaleur et de pression à l'aide de barres chauffantes.

45

50

55

FIG. 1

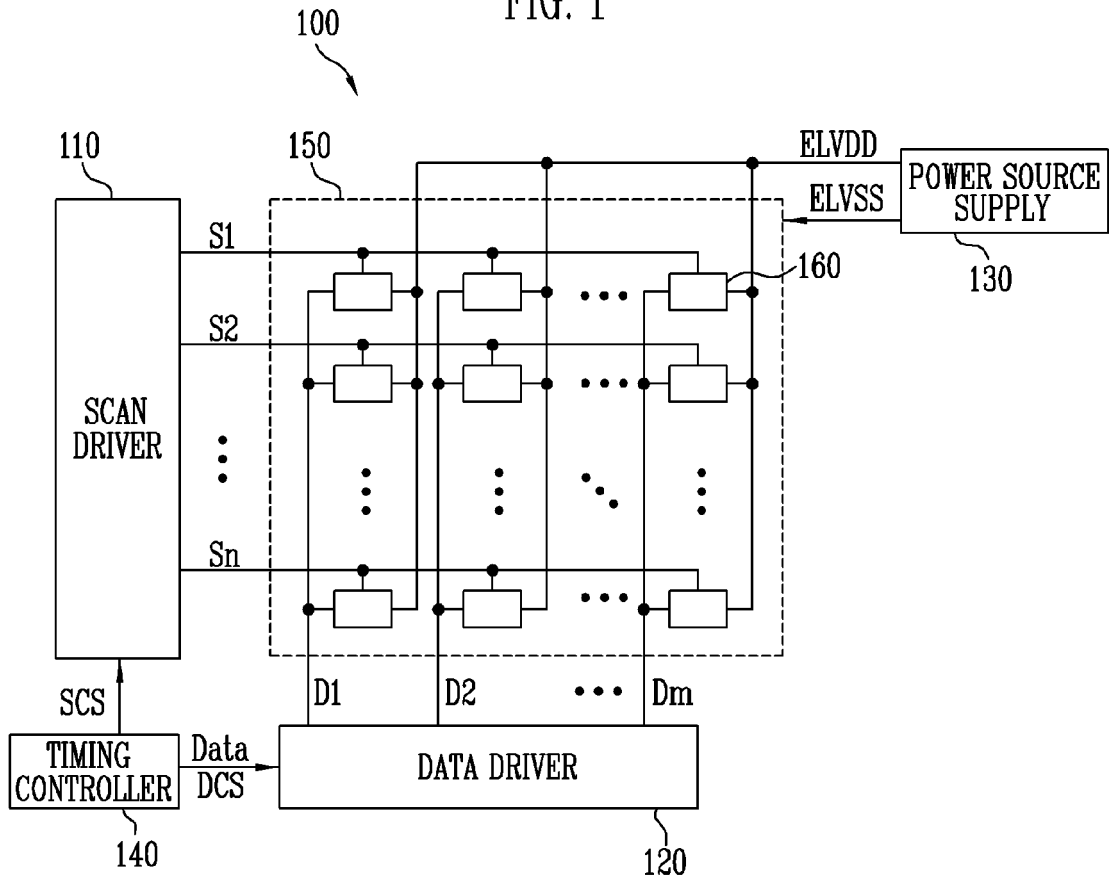


FIG. 2

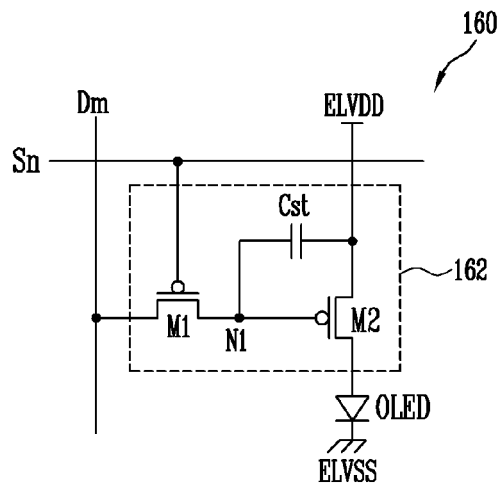
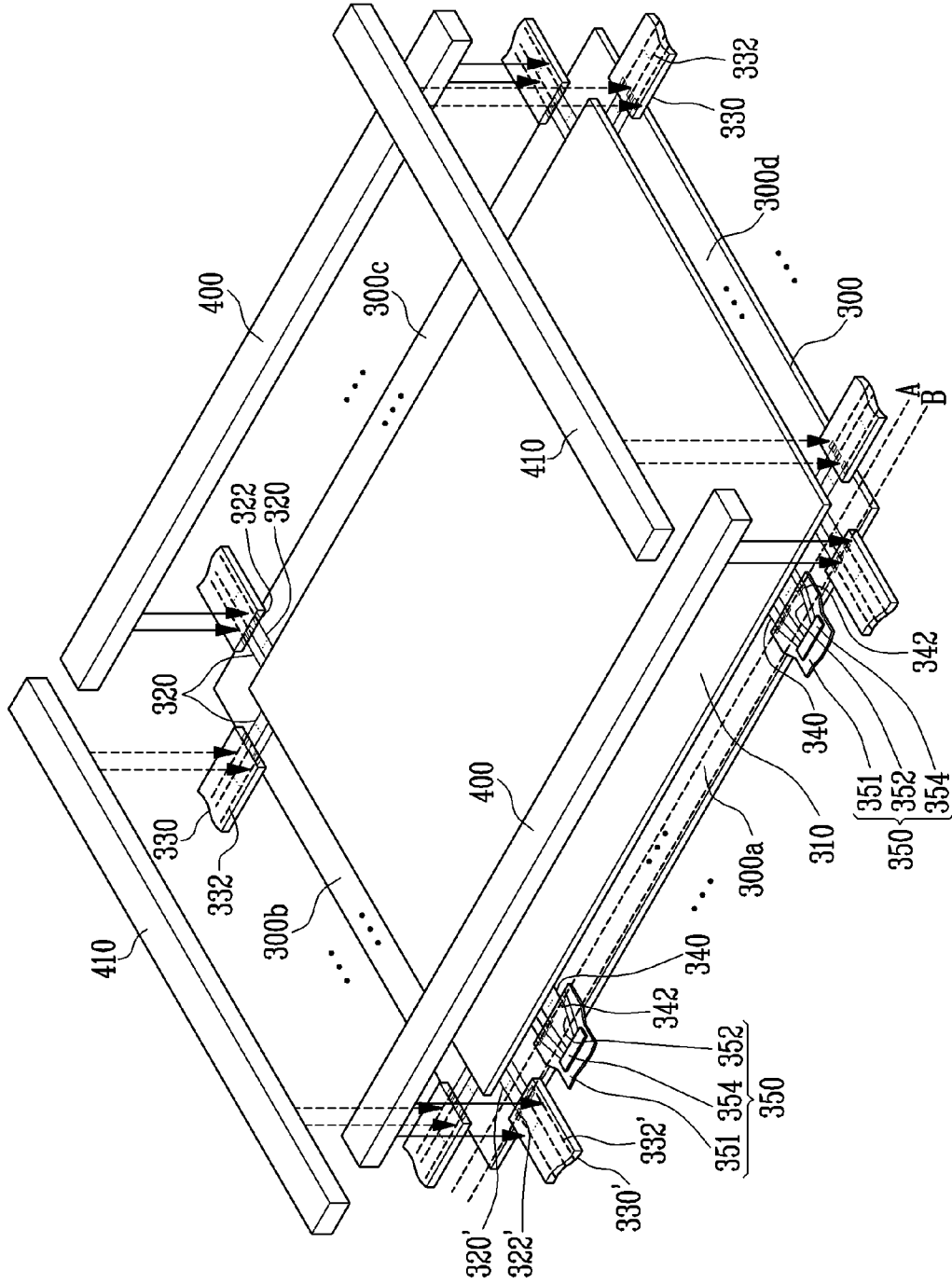


FIG. 4B



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2081178 A2 [0009]
- US 20070134830 A1 [0009]
- US 20050139841 A1 [0009]
- US 20070278952 A1 [0009]

专利名称(译)	有机发光显示器及其制造方法		
公开(公告)号	EP2421042B1	公开(公告)日	2020-05-06
申请号	EP2011151523	申请日	2011-01-20
[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	KO CHUN SEOK LEE JANG DOO		
发明人	KO, CHUN-SEOK LEE, JANG-DOO		
IPC分类号	H01L27/32 H01L51/52		
CPC分类号	H01L27/3276 H01L27/3297 H01L51/5237 H01L27/3288		
优先权	1020100080850 2010-08-20 KR		
其他公开文献	EP2421042A1		
外部链接	Espacenet		

摘要(译)

一种有机发光显示器，包括：有机发光显示面板，其包括显示单元；以及有机发光显示面板。位于显示单元的第一至第四外侧边缘上的像素电源输出引线键合（OLB）焊盘，用于向显示单元提供像素功率；像素电源线耦接像素电源OLB垫，以提供像素电源至显示单元。像素电源柔性印刷电路板，与像素电源OLB焊盘相连；信号OLB焊盘位于第一至第四外部边缘中的至少一个外部边缘上，以向显示单元提供多个驱动信号；信号线耦接至信号OLB垫，以提供驱动信号至显示单元。以及装有驱动LC并粘合到信号OLB焊盘的磁带载体封装。

