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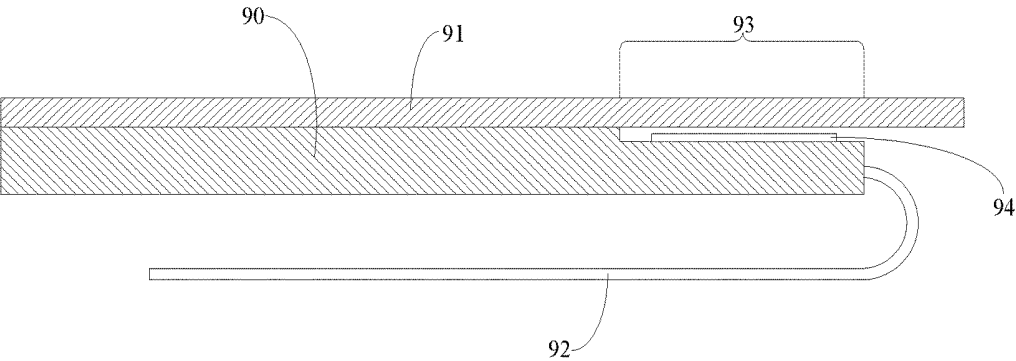


FIG. 1 (PRIOR ART)

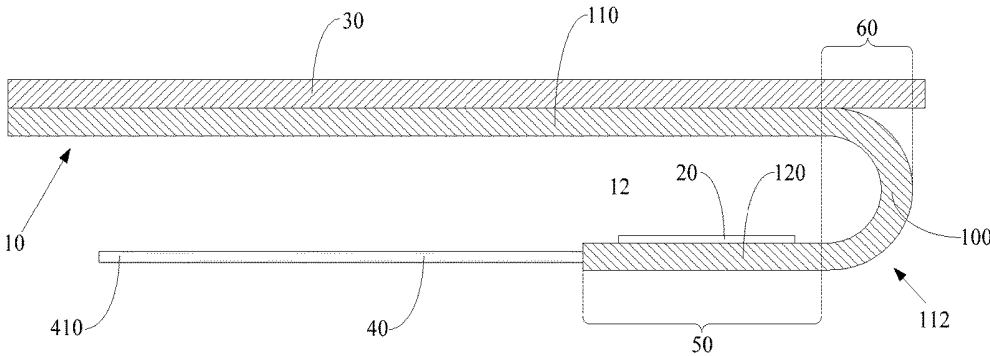
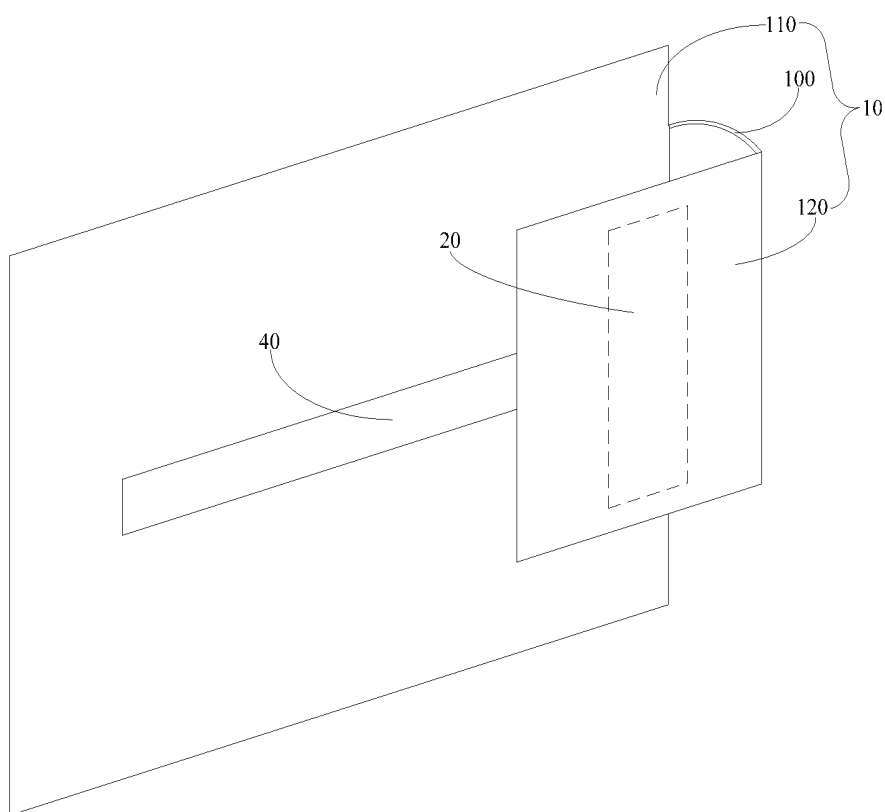
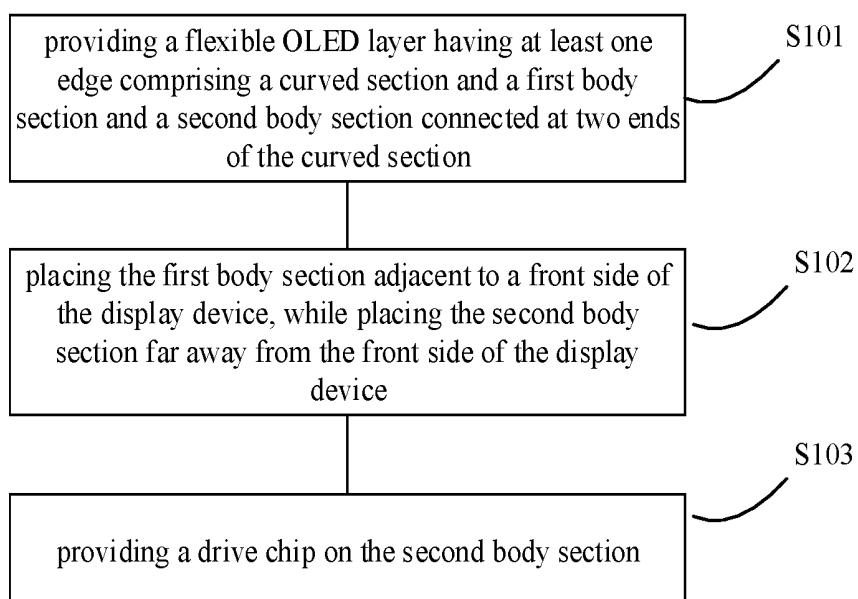


FIG. 2

**FIG. 3****FIG. 4**

ELECTRONIC DEVICE, DISPLAY DEVICE AND METHOD FOR MANUFACTURING A DISPLAY DEVICE

[0001] This application is based on and claims priority to Chinese Patent Application No. 201710055261.7 filed on Jan. 24, 2017, which is incorporated herein by reference in its entirety.

FIELD

[0002] The present disclosure generally relates to the technical field of display device, and more particularly, to an electronic device, display device and method for manufacturing a display device.

BACKGROUND

[0003] Screen-to-body ratio of an electronic device, such as a mobile communication terminal (e.g., a mobile phone), a PDA, a mobile computer, a tablet computer and the like, refers to a relative ratio of a screen area and a front panel area of the electronic device. Greater screen-to-body ratio means a narrower bezel of the electronic device, by which an overall volume of the electronic device may be reduced given a certain screen area, and thereby portability requirements for the electronic device can be satisfied. Thus, bezel-less display is becoming more and more popular among consumers, and is also an inevitable trend for future development of electronic devices such as a mobile phone.

[0004] However, an integrated circuit (IC) bonding area is utilized in traditional manufacturing and display technologies for a screen of an electronic device such as a mobile phone, so as to provide an IC drive chip which is an essential element of a screen display function. In legacy solutions, the IC bonding area is placed above or below the display screen, resulting in some non-display area on the front side of the mobile phone, and thus making it difficult to further increase the screen-to-body ratio. Thus, in legacy solutions, the IC bonding area needs to occupy some screen space, and thereby the bezel-less display cannot be realized.

SUMMARY

[0005] An electronic device, display device and method for manufacturing a display device are provided in the present disclosure.

[0006] According to a first aspect of embodiments of the present disclosure, a display device is provided. The display device includes: a flexible organic light-emitting diode (OLED) layer having at least one edge including a curved section and a first body section and a second body section connected at two ends of the curved section, wherein the first body section is located adjacent to the front side of the display device, while the second body section is located far away from the front side of the display device; and a drive chip provided on the second body section.

[0007] According to a second aspect of embodiments of the present disclosure, an electronic device is provided. The electronic device includes: a housing and a display device as described above, wherein the display device is provided on a front side of the housing.

[0008] According to a third aspect of embodiments of the present disclosure, a method for manufacturing a display device is provided. The method includes: providing a flexible OLED layer having at least one edge comprising a

curved section and a first body section and a second body section connected at two ends of the curved section; placing the first body section adjacent to a front side of the display device, while placing the second body section far away from the front side of the display device; and providing a drive chip on the second body section.

[0009] It is to be understood that the forgoing general description and the following detailed description are illustrative and explanatory only, and are not intended to limit the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments consistent with the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0011] FIG. 1 is a structure diagram of a display device in the related art.

[0012] FIG. 2 is a structure diagram illustrating a display device according to an example embodiment of the present disclosure.

[0013] FIG. 3 is a stereoscopic diagram illustrating the rear side of a flexible OLED layer of a display device according to an example embodiment of the present disclosure.

[0014] FIG. 4 is a flow chart illustrating a method for manufacturing a display device according to an example embodiment of the present disclosure.

DETAILED DESCRIPTION

[0015] Example embodiments will now be described in detail, examples of which are illustrated in the accompanying drawings. The following description refers to the accompanying drawings in which same numbers in different drawings represent same or similar elements unless otherwise described. The implementations set forth in the following description of example embodiments do not represent all implementations consistent with the present disclosure. Instead, they are merely examples of device and methods consistent with aspects related to the present disclosure as recited in the appended claims.

[0016] Referring to FIG. 1, it is a structure diagram of a display device in the related art. The display device includes a display panel 90, a glass cover 91, and a flexible printed circuit board (PCB) 92. The display panel 90 has an IC bonding area 93 on its front side, and an IC drive chip 94 is provided in the IC bonding area 93. The PCB 92 penetrates through and protrudes partly from the display panel 90. Because the IC bonding area 93 is placed front side or rear side of the display panel 90 (in FIG. 1, the IC bonding area 93 is provided at the front side of the display panel 90), it occupies some screen space, and thus there may always be some non-display area on the front side of the display device, which results the screen-to-body ratio cannot be further increased, and thereby the bezel-less display cannot be realized.

[0017] In view of the aforementioned disadvantages in the related art, an electronic device, display device and method for manufacturing a display device are provided in the present disclosure to solve the problem that bezel-less display cannot be realized in display devices in the related art. In the following, the electronic device, display device

and method for manufacturing a display device of the present disclosure will be described in detail in connection with the accompanying figures. Where appropriate, features in the following embodiments and implementations may be combined with each other.

[0018] Referring to FIG. 2, it is a structure diagram illustrating a display device according to an example embodiment of the present disclosure. The display device provided in embodiments of the present disclosure includes: a flexible OLED layer **10** (it serves as a display panel) having at least one edge **12** of which may include a curved section **100**, and a first body section **110** and a second body section **120** connected at two ends of the curved section **100**, wherein the first body section **110** is located adjacent to the front side of the display device (in FIG. 2, the upper side of the flexible OLED layer **10** represents the front side of the display device), while the second body section **120** is located far away from the front side of the display device (in other words, located on a rear side of the display device). The flexible OLED layer is used as the display panel such that it is possible for the display panel to utilize advantages of the OLED display technology, for example, self-luminous, wide viewing angle, almost infinitely high contrast, lower power consumption, and very high reaction speed, etc.

[0019] A drive chip **20** is provided on the second body section **120**. In some embodiments, the drive chip **20** may be placed on a side of the second body section **120** that is near the front side of the display device, so that the drive chip **20** is located in an area inside the flexible OLED layer **10**. The drive chip **20** is configured to drive the display device. Thus, the volume of the display device can be further reduced.

[0020] It should be noted that it may be that only a part of an edge **112** of the first body section **110** of the flexible OLED layer **10** is protruded and curved to form the curved section **100**, and the second body section **120** has the same width as that of the curved section **100**. In some exemplary embodiments, it may be that the edge **112** of the first body section **110** of the flexible OLED layer **10** is entirely protruded and curved to form the curved section **100**. Moreover, the edge **112** of the first body section **110** of the flexible OLED layer **10** to be curved may be a long side of the first body section **110**, or a short side of the first body section **110**. For example, in the example of FIG. 3, it is that only a part of an edge **112** of the first body section **110** of the flexible OLED layer **10** is protruded and curved to form the curved section **100**, while the second body section **120** has the same width as that of the curved section **100**, and the drive chip **20** is provided on the second body section **120**. As described above, because the drive chip **20** is located in an area inside the flexible OLED layer **10**, the drive chip **20** is invisible in FIG. 3.

[0021] In some embodiments, the display device of the present disclosure utilizes the flexible OLED layer as the display screen, which is curved to form the first body section, the curved section, and the second body section, and then places the drive chip on the second body section of the flexible OLED layer located far away to the front side of the display device, such that the drive chip does not occupy any space on the first body section of the flexible OLED layer located adjacent to the front side of the display device, and thereby more spaces may be preserved on the front side of the display device to fulfill bezel-less display.

[0022] In one implementation of the present disclosure, the first body section **110**, the curved section **100** and the

second body section **120** may be integrally formed as one piece. In some exemplary embodiments, the curved angle of the curved section **100** may range from 150° to 210°, and preferably, the curved angle is 180°.

[0023] In one implementation of the present disclosure, the display device may also include a glass cover **30** covering the first body section **110** and the curved section **100** of the flexible OLED layer **10**. Lights emitted from the flexible OLED layer **10** is displayed after passing through the glass cover **30**.

[0024] Referring to FIG. 2, in one implementation of the present disclosure, the display device may also include a PCB **40**. The PCB **40** includes a first part (not shown) and a second part **410** adjacent to each other, wherein the first part penetrates through the first body section **110**, the curved section **100** and the second body section **120**, while the second part **410** protrudes from the second body section **120**. In some exemplary embodiments, the first part and second part **410** of the PCB **40** may be integrally formed. The PCB **40** may be used to provide supports in terms of circuit arrangement for the drive chip **20**.

[0025] In one implementation of the present disclosure, a bonding area **50** may be provided on the second body section **120** of the flexible OLED layer **10**, and the drive chip **20** is placed in the bonding area **50**. In some exemplary embodiments, the drive chip **20** may be an integrated circuit (IC) drive chip, and the bonding area **50** may be an IC bonding area.

[0026] In one implementation of the present disclosure, the display device may also include a controller connected with the first body section **110**, the curved section **100** and the second body section **120**, the controller may be configured to control turn on or turn off of each of the first body section **110**, the curved section **100** and the second body section **120**. Although the glass cover **30** covers the curved section **100** of the flexible OLED layer **10**, the curved area **60** formed by the curved section **100** is not within a visible area and thus is useless for display of the display screen. Further, if the curved section **100** within the curved area **60** is not turned off to stop emitting light, there may exist some risks such as power consumption, light leakage, etc. Thus, the controller controls the curved section **100** and the second body section **120** of the flexible OLED layer **10** to always be in a turned-off state, so as to avoid risks such as power consumption, light leakage, etc. In some exemplary embodiments, the controller may use a software algorithm control to turn off display function of the curved section **100** and the second body section **120**.

[0027] Referring to FIG. 4, it is a flow chart illustrating a method for manufacturing a display device according to an example embodiment of the present disclosure. In connection with FIG. 2 and FIG. 4, a method for manufacturing a display device is also provided in embodiments of the present disclosure. The method may include the following steps.

[0028] Step S101: a flexible OLED layer **10** is provided such that it has at least one edge comprising a curved section **100** and a first body section **110** and a second body section **120** connected at two ends of the curved section **100**.

[0029] Step S102: the first body section **110** is placed adjacent to the front side of the display device (in FIG. 2, the upper side of the flexible OLED layer **10** represents the front

side of the display device), while the second body section **120** is placed far away from the front side of the display device.

[0030] Step **S103**: a drive chip **20** is provided on the second body section **120**. In some embodiments, the drive chip **20** may be placed on a side of the second body section **120** that is near to the front side of the display device, such that the drive chip **20** is located in an area inside the flexible OLED layer **10** to further reduce the volume of the display device.

[0031] In the embodiments described above, the method for manufacturing a display device of the present disclosure utilizes the flexible OLED layer as the display screen which is curved to form the first body section, the curved section, and the second body section, and then provides the drive chip on the second body section of the flexible OLED layer located far away from the front side of the display device, such that the drive chip does not occupy any space on the first body section of the flexible OLED layer located adjacent to the front side of the display device, and thereby more spaces may be preserved on the front side of the display device to fulfill bezel-less display.

[0032] In one implementation of the present disclosure, the curved angle of the flexible OLED layer **10** may range from 150° to 210°, and preferably, 180°. That is, the curved angle of the curved section **100** of the flexible OLED layer **10** may range from 150° to 210°, and preferably, the curved angle is 180°.

[0033] In one implementation of the present disclosure, the method for manufacturing a display device may also include: providing a glass cover **30** covering the first body section **110** and the curved section **100**. Lights emitted from the flexible OLED layer **10** are displayed after passing through the glass cover **30**.

[0034] Referring to FIG. 2, in one implementation of the present disclosure, the method for manufacturing a display device may also include: providing a PCB **40**, the PCB **40** includes a first part (not shown) and a second part **410** adjacent to each other, wherein the first part penetrates through the first body section **110**, the curved section **100** and the second body section **120**, while the second part **410** protrudes from the second body section **120**. In some exemplary embodiments, the first part and second part **410** of the PCB **40** may be integrally formed. The PCB **40** may be used to provide supports in terms of circuit arrangement for the drive chip **20**.

[0035] In one implementation of the present disclosure, the above described step **S103** of providing the drive chip **20** on the second body section **120** may further include: preserving a bonding area **50** on the second body section **120**, and provide the drive chip **20** in the bonding area **50**. In some exemplary embodiments, the drive chip **20** may be an IC drive chip, and the bonding area **50** may be an IC bonding area.

[0036] In one implementation of the present disclosure, the curved section **100** and the second body section **120** may be set to be in a turned-off state. Although the glass cover **30** covers the curved section **100** of the flexible OLED layer **10**, but the curved area **60** formed by the curved section **100** is in an invisible area and thus is useless for the display of the display screen. Further, when the curved section **100** in the curved area **60** is not turned off to stop emitting light, there may exist some risks such as power consumption, light leakage, etc. Thus, the curved section **100** and the second

body section **120** of the curved OLED layer **10** may be set always to be in a turned-off state (i.e., the display function of the curved section **100** and the second body section **120** is turned off), so as to avoid risks such as power consumption, light leakage, etc.

[0037] An electronic device is also provided in embodiments of the present disclosure. The electronic device include a housing and a display device according to the aforementioned embodiments and implementations, or a display device manufactured by the method described above, wherein the display device is provided on a front side of the housing. It should be noted that descriptions about the display device in the aforementioned embodiments and implementations are also suitable for the electronic devices provided in embodiments of the present disclosure.

[0038] In the electronic device of the present disclosure, the display device utilizes the flexible OLED layer as the display screen which is curved to form the first body section, the curved section, and the second body section. The electronic device further includes a display drive chip on the second body section of the flexible OLED layer located far away from the front side of the display device, such that the display drive chip does not occupy any space on the first body section of the flexible OLED layer located adjacent to the front side of the display device. Therefore, more spaces may be preserved on the front side of the display device to fulfill bezel-less display.

[0039] In one implementation of the present disclosure, the electronic device may also include at least one sensor component provided on a rear side of the housing. In some exemplary embodiments, the sensor component may include at least one of a proximity sensor and a light sensor. By providing the sensor component on the rear side of the housing, more spaces on the front side of the housing may be provided to the display device to increase the screen-to-body ratio and beautify appearance of the display device.

[0040] Further, the electronic device of the present disclosure may also include a flashlight, an earpiece component, a camera component, and an inductive touch control component (e.g., an inductive touch control component with fingerprint recognition function), all of which may be provided on the rear side of the housing, with only the display device being provided on the front side of the housing to fulfill bezel-less display.

[0041] In one implementation of the present disclosure, the electronic device may be a mobile communication terminal (e.g., a mobile phone), a personal digital assistant (PDA), a mobile computer, and a tablet computer.

[0042] Other embodiments of the disclosure will be apparent to those skilled in the art from consideration of the specification and practice of the disclosures herein. This disclosure is intended to cover any variations, uses, or adaptations of the disclosure following the general principles thereof and including such departures from the present disclosure as come within known or customary practice in the art. It is intended that the specification and embodiments be considered as illustrative only, with a true scope and spirit of the disclosure being indicated by the following claims.

[0043] It will be appreciated that the present disclosure is not limited to the exact construction that has been described above and illustrated in the accompanying drawings, and that various modifications and changes can be made without

departing from the scope thereof. It is intended that the scope of the invention only be limited by the appended claims.

What is claimed is:

1. A display device, comprising:
 - a flexible organic light-emitting diode (OLED) layer comprising: a first body section, a section body section, and a curved section disposed between the first body section and the section body section, wherein the first body section is located adjacent to a front side of the display device, the second body section is located far away from the front side of the display device, the first body section and the second body section is respectively connected to two ends of the curved section; and
 - a drive chip on the second body section, the drive chip configured to drive the display device.
2. The display device of claim 1, wherein the first body section, the curved section, and the second body section are integrally formed as one piece.
3. The display device of claim 1, where the curved section has a curved angle that ranges between 150° and 210°.
4. The display device of claim 1, further comprising a glass cover covering the first body section and the curved section.
5. The display device of claim 1, further comprising a flexible printed circuit board comprising a first part and a second part adjacent to each other, wherein the first part penetrates through the first body section, the curved section, and the second body section, while the second part protrudes from the second body section.
6. The display device of claim 1, wherein the second body section comprises a bonding area, and the drive chip is disposed in the bonding area.
7. The display device of claim 1, further comprising a controller connected with the first body section, the curved section and the second body section, the controller is configured to control turned-on or turned-off of each of the first body section, the curved section and the second body section.

8. An electronic device, comprising:
 - a housing and a display device, the display device comprising: a flexible organic light-emitting diode (OLED) layer that comprises: a first body section, a section body section, and a curved section disposed between the first body section and the section body section, wherein the first body section is located adjacent to a front side of the display device, the second body section is located far away from the front side of the display device, the first body section and the second body section is respectively connected to two ends of the curved section; and a drive chip on the second body section, the drive chip configured to drive the display device, wherein the display device is disposed on a front side of the housing.
9. A method for manufacturing a display device, comprising:
 - providing a flexible OLED layer comprising: a curved section and a first body section and a second body section connected to two ends of the curved section;
 - placing the first body section adjacent to a front side of the display device, while placing the second body section far away from the front side of the display device; and
 - providing a drive chip on the second body section.
10. The method of claim 9, wherein the curved section has a curved angle that ranges between 150° and 210°.
11. The method of claim 9, further comprising: providing a glass cover covering the first body section and the curved section.
12. The method of claim 9, further comprising: providing a flexible printed circuit board comprising a first part and a second part adjacent to each other, wherein the first part penetrates through the first body section, the curved section and the second body section, while the second part protrudes from the second body section.
13. The method of claim 9, wherein providing the drive chip on the second body section comprises:
 - preserving a bonding area on the second body section, and
 - placing the drive chip in the bonding area.
14. The method of claim 9, wherein the curved section and the second body section are set to be turned-off state.

* * * * *

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申请(专利权)人(译)	北京赛美移动软件有限公司		
当前申请(专利权)人(译)	北京赛美移动软件有限公司		
[标]发明人	YU TAO HAN GAOCAI LI ZHUXIN		
发明人	YU, TAO HAN, GAOCAI LI, ZHUXIN		
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摘要(译)

本公开涉及电子设备，显示设备和用于制造显示设备的方法。该显示装置包括：柔性OLED层，其具有至少一个边缘，该边缘包括弯曲部分和第一主体部分以及连接在该弯曲部分的两端的第二主体部分，其中第一主体部分位于邻近前侧的位置。显示装置，而第二主体部分位于远离显示装置的前侧；以及设置在第二主体部分上的驱动芯片。

