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(54) **PIXEL, ORGANIC LIGHT EMITTING DISPLAY DEVICE INCLUDING THE PIXEL AND DRIVING METHOD OF ORGANIC LIGHT EMITTING DISPLAY DEVICE**

PIXEL, ORGANISCHE LICHEMITTIERENDE ANZEIGEVORRICHTUNG MIT DEM PIXEL UND ANSTEUERUNGSVERFAHREN EINER ORGANISCHEN LICHEMITTIERENDEN ANZEIGEVORRICHTUNG

PIXEL, DISPOSITIF D’AFFICHAGE ÉLECTROLUMINESCENT ORGANIQUE COMPRENANT LE PIXEL ET PROCÉDÉ DE COMMANDE D’UN TEL DISPOSITIF D’AFFICHAGE

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

(72) Inventor: **CHO, Geun Ho
17113 Gyeonggi-do (KR)**

(74) Representative: **Mouteney, Simon James
Marks & Clerk LLP
15 Fetter Lane
London EC4A 1BW (GB)**

(56) References cited:
**EP-A1- 2 402 932 CN-A- 104 637 431
US-A1- 2004 222 943 US-A1- 2005 219 169
US-A1- 2009 284 500 US-A1- 2010 091 001
US-A1- 2012 001 896 US-A1- 2013 271 501
US-A1- 2015 170 576**

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Description**BACKGROUND****1. Field**

[0001] Embodiments of the present invention relate to a pixel, an organic light emitting display device including the pixel, and a driving method of the organic light emitting display device.

2. Description of the Related Art

[0002] Recently, various display devices having reduced weight and dimensions, which are capable of eliminating disadvantages of a cathode ray tube (CRT), have been developed. Examples of these display devices include a liquid crystal display, a field emission display, plasma display panel, and an organic light emission display device.

[0003] In recent years, organic light emitting display devices have been employed as devices such as smart phones and pads as well as TVs but excessive power consumption can cause various problems. There is a desire therefore to provide a device, such as a smart phone or a pad, capable of recognizing movement of human body organs (hands, eyes, heads, and the like) to determine whether it is being used and, when it is not used by a human, capable of reducing power consumption. US 2013/0271501 discloses an OLED display. US 2010/0091001 discloses a pixel capable of abnormal light emission. US 2005/0219169 discloses an electro-luminescence display panel and a driving method thereof for preventing a life shortening of the EL caused by a direct current. US 2012/001896 discloses a pixel having an improved response time. US 2015/170576 discloses an OLED with a first power source which is a high potential pixel power source, a second power source which is a low potential pixel power source, and a third power source which is an initialization power source. EP 2402932 discloses a pixel having an improved response time. CN 104637431 discloses a gate on array driving circuit. US 2009/0284500 discloses a display device with a boundary switch separating the display area into a plurality of sub-display areas and placed between the sub-display areas to connect or disconnect the source lines and/or the gate lines. US 2004/0222943 discloses a display apparatus including a data driver that is common to a main screen and a sub screen.

SUMMARY

[0004] The present invention sets out to provide a display device having improved power consumption.

[0005] According to a first aspect, there is provided a pixel according to Claim 1. According to a second aspect, there is provided a driving method of an organic light emitting display device according to Claim 7.

[0006] Details of embodiments may be found in the dependent claims. The present disclosure describes various aspects that are of interest in the context of the invention, and which may be referred to as embodiments even though they are not comprised in the scope of the claims, or describe only some of the features required for the invention. The present invention is defined solely by the scope of the claims.

[0007] In accordance with a first aspect of the present invention, there is provided a pixel including an organic light emitting diode, and a driving circuit configured to supply current to the organic light emitting diode, the driving circuit including a driving transistor configured to control a level of the current flowing in the organic light emitting diode based on a level of a voltage supplied to a data line, a power supply configured to supply an initialization power, and a first transistor including a first electrode electrically connected to an anode of the organic light emitting diode, a second electrode configured to receive the initialization power, and a gate electrode electrically connected to the data line, wherein the first transistor is configured to control the supply of the initialization power to the anode of the organic light emitting diode such that when the first transistor is turned on such that the organic light emitting diode does not emit light.

[0008] The driving circuit further includes a second transistor including a first electrode electrically connected to the data line, a second electrode electrically connected to a first electrode of the driving transistor, and a gate electrode electrically connected to a first scan line, a third transistor including a first electrode electrically connected to a second electrode of the driving transistor, a second electrode electrically connected to a gate electrode of the driving transistor, and a gate electrode electrically connected to the first scan line, a fourth transistor including a first electrode electrically connected to the gate electrode of the driving transistor, a second electrode configured to receive the initialization power, and a gate electrode electrically connected to a second scan line, a fifth transistor including a first electrode configured to receive a first power, a second electrode electrically connected to the first electrode of the driving transistor, and a gate electrode electrically connected to an emission control line, a sixth transistor including a first electrode electrically connected to the second electrode of the driving transistor, a second electrode electrically connected to the anode of the organic light emitting diode, and a gate electrode electrically connected to the emission control line, a seventh transistor including a first electrode electrically connected to the anode of the organic light emitting diode, a second

electrode configured to receive the initialization power, and a gate electrode electrically connected to a third scan line, and a storage capacitor including a first end configured to receive the first power, and a second end electrically connected to the gate electrode of the driving transistor.

[0009] A cathode of the organic light emitting diode may be configured to receive a second power having a second voltage level that is lower than a first voltage level of the first power, and the first scan line may be configured to receive a scan signal after the scan signal is supplied to the second scan line and to the third scan line.

The driving transistor may include a first electrode that is configured to receive a first power, and a second electrode that is electrically connected to the anode of the organic light emitting diode, the driving circuit may further include a second transistor including a first electrode electrically connected to the data line, a second electrode electrically connected to a gate electrode of the driving transistor, and a gate electrode electrically connected to a scan line, and a storage capacitor including a first end configured to receive the first power, and a second end electrically connected to the gate electrode of the driving transistor, and a cathode of the organic light emitting diode may be configured to receive a second power having a second voltage level that is lower than a first voltage level of the first power.

[0010] In accordance with a second aspect of the present invention, there is provided an organic light emitting display device including a display panel including a first display area and a second display area that do not overlap each other, wherein at least one of the first display area and the second display area comprises at least one pixel according to the first aspect and a display panel driver configured to drive the display panel, the display panel including scan lines configured to transfer scan signals, data lines configured to transfer data voltages, and pixels in the first display area or the second display area and electrically connected to the scan lines and the data lines, wherein the display panel driver includes a data driver configured to generate the data voltages based on received image signals, a first signal driver configured to generate scan signals that are supplied to the first display area, and a second signal driver configured to generate scan signals that are supplied to the second display area, and wherein, the OLED display device is adapted to determine that a predetermined condition is satisfied and to not drive the first signal driver when the predetermined condition is satisfied such that the pixels in the first display area do not emit light.

[0011] The first display area may be flat, and the second display area may be curved. The display panel may further include bridge transistors connecting scan lines between the first display area and the second display area, and the scan signals supplied to the second display area might not be supplied to the first display area, and wherein the display is configured such that when the bridge transistors are switched off, the scan signals supplied to the second display area are not supplied to the first display area, and the scan signals supplied to the first display area are not supplied to the second display area.

[0012] Each of the pixels in the first display area may include an organic light emitting diode, and a driving circuit configured to supply a current to the organic light emitting diode, the driving circuit may include a driving transistor configured to control a level of current flowing in the organic light emitting diode based on a level of a voltage supplied to one of the data lines, and a first transistor including a first electrode electrically connected to an anode of the organic light emitting diode, a second electrode configured to receive an initialization power, and a gate electrode electrically connected to the one of the data lines, and the first transistor may be configured to be turned on to supply the initialization power to the organic light emitting diode when the predetermined condition is satisfied.

[0013] The organic light emitting display device may further include emission control lines configured to transfer emission control signals to the pixels, the first signal driver may be further configured to generate the emission control signals supplied to the first display area, the second signal driver may be further configured to generate the emission control signals supplied to the second display area, the driving circuit may further include a second transistor including a first electrode electrically connected to the data line, a second electrode electrically connected to a first electrode of the driving transistor, and a gate electrode electrically connected to a first scan line, a third transistor including a first electrode electrically connected to a second electrode of the driving transistor, a second electrode electrically connected to a gate electrode of the driving transistor, and a gate electrode electrically connected to the first scan line, a fourth transistor including a first electrode electrically connected to the gate electrode of the driving transistor, a second electrode configured to receive the initialization power, and a gate electrode electrically connected to a second scan line, a fifth transistor including a first electrode configured to receive a first power, a second electrode electrically connected to the first electrode of the driving transistor, and a gate electrode electrically connected to an emission control line, a sixth transistor including a first electrode electrically connected to the second electrode of the driving transistor, a second electrode electrically connected to the anode of the organic light emitting diode, and a gate electrode electrically connected to the emission control line, a seventh transistor including a first electrode electrically connected to the anode of the organic light emitting diode, a second electrode configured to receive the initialization power, and a gate electrode electrically connected to a third scan line, and a storage capacitor including a first end configured to receive the first power, and a second end electrically connected to the gate electrode of the driving transistor, and a cathode of the organic light emitting diode may be configured to receive a voltage level of a second power that is lower than a voltage level of the first power.

[0014] Each of the pixels may have a same structure.

[0015] The display panel driver may further include a timing controller that is configured to generate a data timing control signal and a scan timing control signal based on externally supplied image signals or timing signals, output the image signals and the data timing control signal to the data driver, drive the first signal driver and the second signal driver, and output the scan timing control signal to the first signal driver and the second signal driver, when a use-determining signal having a first logic value is received, and drive the second signal driver, and output the scan timing control signal to the second signal driver, when the use-determining signal having a second logic value that is different from the first logic value is received.

[0016] The timing controller may be further configured to generate an emission timing control signal, output the emission timing control signal to the first signal driver and to the second signal driver when the use-determining signal having the first logic value is received, and output a scan timing control signal and the emission timing control signal to the second signal driver when the use-determining signal having the second logic value is received.

[0017] In accordance with yet another aspect of the present invention, there is provided a driving method of an organic light emitting display device including a display panel having a first display area and a second display area that do not overlap each other, wherein at least one of the first display and the second display comprises at least one pixel according to the first aspect and a display panel driver configured to drive the display panel, the method including determining whether the first display area is used, driving the first display area and the second display area when it is determined that the first display area is used, and driving the second display area but not the first display area, when it is determined that the first display area is not used.

[0018] The determining whether the first display area is used may include receiving and analyzing a use-determining signal when the use-determining signal is received from the outside, and determining that the first display area is used when the use-determining signal has a first logic value, and determining that the first display area is not used when the use-determining signal has a second logic value that is different from the first logic value, or receiving and analyzing image signals when the use-determining signal is not received from the outside, and determining that the first display area is used when at least one of the image signals corresponding to the first display area does not correspond to black grays, and determining that the first display area is not used when all of the image signals corresponding to the first display area corresponds to black grays.

[0019] The display panel may further include bridge transistors between the first display area and the second display area, scan lines configured to transfer scan signals, data lines configured to transfer data voltages, and pixels in the first display area or the second display area and electrically connected to the scan lines and the data lines, the display panel driver may include a data driver configured to generate the data voltages based on received image signals, a first signal driver configured to generate scan signals supplied to the first display area, and a second signal driver configured to generate scan signals supplied to the second display area, and the driving of the second display area may include supplying data voltages having voltage levels that are lower than a given voltage level to data lines corresponding to the first display area, stopping the driving of the first signal driver, and turning off the bridge transistors.

[0020] In accordance with aspects of embodiments of the present invention, it is possible to provide pixels, an organic light emitting display device including the pixels, and a signal driver, and to provide a driving method of the organic light emitting display device. In this regard, when a portion of the organic light emitting display device is not used, a power amount is reduced by supplying data voltages of which levels are lower than a predetermined level to pixels included in the not-used portion thereof such that organic light emitting diodes included in the pixels emit no light. In this case, the signal driver stops driving the supply of scan signals to the non-emitting pixels to reduce power consumption.

[0021] The invention is defined by the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Example embodiments of the invention will now be described more fully hereinafter with reference to the accompanying drawings, wherein:

FIG. 1 is a view for describing an organic light emitting display device according to an embodiment of the present invention;

FIG. 2 is a view for describing an example of a structure of pixels included in the display panel of FIG. 1;

FIG. 3 is a view for describing another example of a structure of pixels included in the display panel of FIG. 1;

FIG. 4 is a flowchart for describing a driving method of an organic light emitting display device according to an embodiment of the present invention;

FIG. 5 is a flowchart for describing a method of determining whether a first display area is used in the driving method of the organic light emitting display device of FIG. 4;

FIG. 6 is a flowchart for describing a method of driving a first display area and a second display area in the driving method of organic light emitting display device of FIG. 4; and

FIG. 7 is a flowchart for describing a method of driving a first display area and a second display area in the driving

method of organic light emitting display device of FIG. 4.

DETAILED DESCRIPTION

[0023] Features of the inventive concept and methods of accomplishing the same may be understood more readily by reference to the following detailed description of embodiments and the accompanying drawings. The inventive concept may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Hereinafter, example embodiments will be described in more detail with reference to the accompanying drawings, in which like reference numbers refer to like elements throughout. The present invention, however, may be embodied in various different forms, and should not be construed as being limited to only the illustrated embodiments herein. Rather, these embodiments are provided as examples so that this disclosure will be thorough and will convey the aspects and features of the present invention to those skilled in the art. Accordingly, processes, elements, and techniques that are not necessary to those having ordinary skill in the art for a complete understanding of the aspects and features of the present invention may not be described. Unless otherwise noted, like reference numerals denote like elements throughout the attached drawings and the written description, and thus, descriptions thereof will not be repeated. In the drawings, the relative sizes of elements, layers, and regions may be exaggerated for clarity.

[0024] It will be understood that, although the terms "first," "second," "third," etc., may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, a first element, component, region, layer or section described below could be termed a second element, component, region, layer or section, without departing from the scope of the present invention.

[0025] Spatially relative terms, such as "beneath," "below," "lower," "under," "above," "upper," and the like, may be used herein for ease of explanation to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or in operation, in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" or "under" other elements or features would then be oriented "above" the other elements or features. Thus, the example terms "below" and "under" can encompass both an orientation of above and below. The device may be otherwise oriented (e.g., rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein should be interpreted accordingly.

[0026] It will be understood that when an element or layer is referred to as being "on," "connected to," or "coupled to" another element or layer, it can be directly on, connected to, or coupled to the other element or layer, or one or more intervening elements or layers may be present. In addition, it will also be understood that when an element or layer is referred to as being "between" two elements or layers, it can be the only element or layer between the two elements or layers, or one or more intervening elements or layers may also be present.

[0027] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present invention. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises," "comprising," "includes," and "including," when used in this specification, specify the presence of the stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. Expressions such as "at least one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

[0028] As used herein, the term "substantially," "about," and similar terms are used as terms of approximation and not as terms of degree, and are intended to account for the inherent deviations in measured or calculated values that would be recognized by those of ordinary skill in the art. Further, the use of "may" when describing embodiments of the present invention refers to "one or more embodiments of the present invention." As used herein, the terms "use," "using," and "used" may be considered synonymous with the terms "utilize," "utilizing," and "utilized," respectively. Also, the term "exemplary" is intended to refer to an example or illustration.

[0029] The electronic or electric devices and/or any other relevant devices or components according to embodiments of the present invention described herein may be implemented utilizing any suitable hardware, firmware (e.g. an application-specific integrated circuit), software, or a combination of software, firmware, and hardware. For example, the various components of these devices may be formed on one integrated circuit (IC) chip or on separate IC chips. Further, the various components of these devices may be implemented on a flexible printed circuit film, a tape carrier package (TCP), a printed circuit board (PCB), or formed on one substrate. Further, the various components of these devices may be a process or thread, running on one or more processors, in one or more computing devices, executing computer program instructions and interacting with other system components for performing the various functionalities described

herein. The computer program instructions are stored in a memory which may be implemented in a computing device using a standard memory device, such as, for example, a random access memory (RAM). The computer program instructions may also be stored in other non-transitory computer readable media such as, for example, a CD-ROM, flash drive, or the like. Also, a person of skill in the art should recognize that the functionality of various computing devices may be combined or integrated into a single computing device, or the functionality of a particular computing device may be distributed across one or more other computing devices without departing from the scope of the embodiments of the present invention.

[0030] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the present invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and/or the present specification, and should not be interpreted in an idealized or overly formal sense, unless expressly so defined herein.

[0031] FIG. 1 is a view for describing an organic light emitting display device according to an embodiment of the present invention. The organic light emitting display device includes a display panel 100, a display panel driver 200 for driving the display panel 100, and a power supply (e.g., a DC-DC converter) 300 for supplying a power to the display panel 100.

[0032] The display panel 100 includes a first display area 100-1 and a second display area 100-2, which do not overlap each other. The first display area 100-1 may be flat, and the second display area 100-2 may be curved. When a smart phone is used as an example, the first display area 100-1 might be driven only when the smart phone is used by a user, such as by use of a button or the like mounted on a touch screen panel or on other hardware, and the second display area 100-2 may be driven when the smart phone is not used by a user. When a call request or a message is received, the first display area 100-1 might not be driven, while the second display area 100-2 may be driven.

[0033] The display panel 100 includes first scan lines $S(0)-1, \dots, S(a)-1, \dots, S(m)-1$ (the first scan lines hereinafter being referred to as first scan lines S-1) for transferring scan signals to the first display area 100-1 (m being a positive integer, and a being in a range from 0 to m), second scan lines $S(0)-2, \dots, S(a)-2, \dots, S(m)-2$ (the second scan lines hereinafter being referred to as S-2) for transferring scan signals to the second display area 100-2, first emission control lines $E(0)-1, \dots, E(a)-1, \dots, E(m)-1$ (hereinafter, referred to as first emission control lines E-1) for transferring emission control signals to the first display area 100-1, second emission control lines $E(0)-2, E(a)-2, \dots, E(m)-2$ (hereinafter, referred to as second emission control lines E-2) for transferring emission control signals to the second display area 100-2, data lines $D0, \dots, Db, Db+1, \dots, Dn$ (referred to as data lines D) for transferring data voltages to the display panel 100 (n being a positive integer, and b being in a range from 0 to n), and pixels $P(0,0)$ to $P(m,n)$ (hereinafter, referred to as pixels P) that are electrically connected to the first scan lines S-1, the second scan lines S-2, the first emission control lines E-1, the second emission control lines E-2, and the data lines D. Each of the pixels P may have the same structure. The first scan lines S-1 and the second scan lines S-2 may be collectively referred to as scan lines S, and the first emission control lines E-1 and the second emission control lines E-2 may be collectively referred to as emission control lines E.

[0034] In the present embodiment, pixels $P(0, 0)$ to $P(m, b)$ are included in the first display area 100-1, and pixels $P(0, b+1)$ to $P(m, n)$ are included in the second display area 100-2. The pixels $P(0, 0)$ to $P(m, b)$ may be defined as first pixels P-1, and pixels $P(0, b+1)$ to $P(m, n)$ may be defined as the second pixels P-2. Further, the data lines $D0$ to Db may be defined as first data lines D-1, and data lines $Db+1$ to Dn may be defined as second data lines D-2. An example pixel $P(a, b)$ included in the first display area 100-1 is electrically connected to the scan line $S(a)-1$, the data line Db , and the emission control line $E(a)-1$, but this is merely an example. Alternatively, the example pixel $P(a, b)$ may be electrically connected to two or more scan lines, and may be electrically connected to two or more emission control lines. Bridge transistors $BT_{e0}, BT_{s0}, \dots, BT_{em},$ and BT_{sm} (hereinafter, referred to as bridge transistors BT) may be included between the first display area 100-1 and the second display area 100-2 according to another exemplary embodiment. The bridge transistors BT include scan bridge transistors $BT_{s0}, \dots, BT_{sa}, \dots, BT_{sm}$ (hereinafter, referred to as scan bridge transistors BTs), which are connected between respective ones of the scan lines S and respective emission control bridge transistors $BT_{e0}, \dots, BT_{ea}, \dots, BT_{em}$ (hereinafter, referred to as control bridge transistors BTe), which are connected between respective ones of the emission control lines E. The display panel 100 may further include a bridge transistor control line BTC, and a gate electrode of each of the bridge transistors BT may be electrically connected to the bridge transistor control line BTC. When the first display area 100-1 and the second display area 100-2 are both driven, the bridge transistors BT may be turned on to smoothly supply the scan signals and the emission control signals to the pixels P. When the second display area 100-2 is exclusively driven to the exclusion of the first display area 100-1, the emission signals and the scan signals for the second pixels P-2 may otherwise cause the first pixels P-1 to malfunction. Accordingly, the bridge transistors BT may be turned off.

[0035] The display panel driver 200 includes a timing controller 220, a data driver 230, a first signal driver 240-1, and a second signal driver 240-2.

[0036] The timing controller 220 receives externally supplied image signals RGB and timing signals "Timing signals."

The timing signals "Timing signals" include a vertical synchronization signal Vsync, a horizontal synchronization signal Hsync, and a dot clock DOTCLK. The timing controller 220 outputs image signals RGB and a data timing control signal DCS to the data driver 230 based on the image signals RGB and the timing signals "Timing signals," outputs a first scan timing control signal SCS1 and a first emission timing control signal ECS1 to the first signal driver 240-1, and outputs a second scan timing control signal SCS2 and a second emission timing control signal ECS2 to the second signal driver 240-2. According to another exemplary embodiment, the timing controller 220 may further receive an externally supplied use-determining signal "Use."

[0037] When a flip cover of smart device including an organic light emitting display device is opened, it is determined that a user intends to use the organic light emitting display device. As a result, a use-determining signal "Use" having a first logic value may be formed by an external device. In contrast, when the flip cover is closed, it is determined that a user is not using the organic light emitting display device. As a result, a use-determining signal "Use" having a second logic value that is different from the first logic value may be formed by the external device. In this regard, the first logic value of the use-determining signal "Use" may have a high level, and the second logic value may have a low level, although this is merely an example.

[0038] When the use-determining signal "Use" having the first logic value is received, both of the first signal driver 240-1 and the second signal driver 240-2 may be driven. The first scan timing control signal SCS1 may correspond to the second scan timing control signal SCS2, and the first emission timing control signal ECS1 may correspond to the second emission timing control signal ECS2. When the use-determining signal "Use" having the second logic value is received, the second signal driver 240-2 may be exclusively driven to the exclusion of the first signal driver 240-1, and the first scan timing control signal SCS1 and the first emission timing control signal ECS1 might not be outputted.

[0039] In FIG. 1, the use-determining signal "Use" is externally supplied to the timing controller 220, but this is merely an example. Alternatively, the timing controller 220 may generate the use-determining signal "Use" by directly determining whether to be used without receiving the use-determining signal "Use". For example, when the first display area 100-1 is not driven, all image signals corresponding to the first display area 100-1 among the image signals RGB may correspond to a black gray. The timing controller 220 may determine that the first display area 100-1 is not used when all of the image signals corresponding to the first display area 100-1 among the image signals RGB correspond to the black gray. In this case, the timing controller 220 may generate the use-determining signal "Use" having the second logic value, may exclusively drive the second signal driver 240-2 to the exclusion of the first signal driver 240-1, and might not output the first scan timing control signal SCS1 and the first emission timing control signal ECS1. In contrast, when at least some of the image signals corresponding to the first display area 100-1 among the image signals RGB do not correspond to the black gray, the timing controller 220 may generate the use-determining signal "Use" having the first logic value, may drive both the first signal driver 240-1 and the second signal driver 240-2, and may also output the first scan timing control signal SCS1 and the first emission timing control signal ECS1. According to another exemplary embodiment, when the emission control lines E are omitted, the first emission timing control signal ECS1 and the second emission timing control signal ECS2 may also be omitted. The timing controller 220 may transmit the use-determining signal "Use" to the data driver 230.

[0040] The data driver 230 latches image data RGB inputted from the timing controller 220 in response to the data timing control signal DCS. When the use-determining signal "Use" having the first logic value is received, the data driver 230 supplies a voltage for turning on the bridge transistors BT to the bridge transistor control line BTC. In contrast, when the use-determining signal "Use" having the second logic value is received, the data driver 230 supplies a voltage for turning off the bridge transistors BT to the bridge transistor control line BTC. A level of the voltage supplied to the bridge transistor control line BTC when the use-determining signal "Use" having the first logic value may be lower than a level of the voltage supplied to the bridge transistor control line BTC when the use-determining signal "Use" having the second logic value is received. The data driver 230 may include a plurality of source drives IC, and the source drives IC may be electrically connected to the bridge transistor control line BTC and to the data lines D of the display panel 100 through a chip on glass (COG) process or through a tape automated bonding (TAB) process.

[0041] The first signal driver 240-1 sequentially supplies scan signals to the first scan lines S-1 in response to the first scan timing control signal SCS1. The first signal driver 240-1 may be directly formed on the substrate of the display panel 100 by a gate in panel (GIP) method, or may be electrically connected to the first scan lines S-1 of the display panel 100 by a TAB process. When the first emission control lines E-1 are formed on the display panel 100, the first signal driver 240-1 sequentially supplies emission control signals to the first emission control lines E-1 in response to the first emission timing control signal ECS1.

[0042] The second signal driver 240-2 sequentially supplies scan signals to the second scan lines S-2 in response to the second scan timing control signal SCS2. The second signal driver 240-2 may be directly formed on the substrate of the display panel 100 by the GIP method, or may be electrically connected to the second scan lines S-2 of the display panel 100 by the TAB process. When the second emission control lines E-2 are formed on the display panel 100, the second signal driver 240-2 sequentially supplies emission control signals to the second emission control lines E-2 in response to the second emission timing control signal ECS2.

[0043] The power supply 300 supplies a first power ELVDD, a second power ELVSS, and an initialization power Vint to the display panel 100. A voltage level of the initialization power Vint is set to turn off the organic light emitting diode OLED(a, b) when the initialization power Vint is supplied to the anode "Anode" (see FIG. 2). For example, the voltage level of the initialization power Vint may be lower than a voltage level of the first power ELVDD, and may be higher or lower than that of the second power ELVSS.

[0044] FIG. 2 is a view for describing an example of a structure of pixels included in the display panel of FIG. 1. For convenience of description, the pixel P(a, b) among the pixels P will be described.

[0045] The pixel P(a, b) includes an organic light emitting diode OLED(a, b) and a driving circuit DC(a, b) for supplying current to the organic light emitting diode OLED(a, b), and the driving circuit DC(a, b) includes a driving transistor DT, first to seventh transistors T1 to T7, and a storage capacitor Cst. The organic light emitting diode OLED(a, b) includes an anode "Anode" and a cathode "Cathode." The pixel P(a, b) is electrically connected to a data line Db, scan lines S(a)-1, S(a-1)-1, and S(a-k)-1 (k being a natural number), and an emission control line E(a)-1. The driving transistor DT and the first to seventh transistors T1 to T7 may each be a pMOS transistor, or may be an nMOS transistor.

[0046] The driving transistor DT controls the level of a current flowing in the organic light emitting diode OLED(a, b) based on the level of a voltage supplied to the data line Db that is electrically connected to the pixel P(a, b). A first electrode of the driving transistor DT may serve as any one of the source electrode and the drain electrode, and the second electrode may serve as the other one of the source electrode and the drain electrode. In this regard, for the convenience of description, the first electrode of the driving transistor DT may serve as the source electrode, and the second electrode of the driving transistor DT may serve as the drain electrode. However, this is merely an example. According to types of the transistors, it may be determined whether the first electrode serves as the source electrode or the drain electrode, and whether the second electrode serves as the source electrode or the drain electrode. A method by which the driving transistor DT controls the level of a current flowing in the organic light emitting diode OLED(a, b) will be described in detail later.

[0047] A first electrode of the first transistor T1 is electrically connected to the anode "Anode" of the organic light emitting diode OLED(a, b), the Initialization power Vint is supplied to a second electrode of the first transistor T1, and a gate electrode of the first transistor T1 is electrically connected to the data line Db. When the level of a data voltage supplied to the data line Db is equal to or lower than a given voltage level (e.g., 0 V), the first transistor T1 is turned on to supply the initialization power Vint to the anode "Anode" of the organic light emitting diode OLED(a, b), and as a result, the organic light emitting diode OLED(a, b) does not emit light.

[0048] A first electrode of the second transistor T2 is electrically connected to the data line Db, a second electrode of the second transistor T2 is electrically connected to the first electrode of the driving transistor DT, and a gate electrode of the second transistor T2 is electrically connected to the scan line S(a)-1. When a scan signal is supplied to the scan line S(a)-1, the second transistor T2 is turned on to supply a data voltage from the data line Db to the first electrode of the driving transistor DT.

[0049] A first electrode of the third transistor T3 is electrically connected to the second electrode of the driving transistor DT, a second electrode of the third transistor T3 is electrically connected to the gate electrode of the driving transistor DT, and a gate electrode of the third transistor T3 is electrically connected to the scan line S(a)-1. When a scan signal is supplied to the scan line S(a)-1, the third transistor T3 is turned on, and the gate electrode of the driving transistor DT is electrically connected to the second electrode of the driving transistor DT. That is, the driving transistor DT is diode connected.

[0050] A first electrode of the fourth transistor T4 is electrically connected to the gate electrode of driving transistor DT, the initialization power Vint is supplied to a second electrode of the fourth transistor T4, and a gate electrode of the fourth transistor T4 is electrically connected to the scan line S(a)-1. When a scan signal is supplied to a scan line S(a)-1, the fourth transistor T4 is turned on, and the initialization power Vint is supplied to the gate electrode of the driving transistor DT. When the scan signal is sequentially supplied to the first scan lines S-1, the scan signal is supplied to the scan line S(a)-1 after the scan signal is supplied to the scan line S(a-1)-1.

[0051] The first power ELVDD is supplied to a first electrode of the fifth transistor T5, a second electrode of the fifth transistor T5 is electrically connected to the first electrode of the driving transistor DT, and a gate electrode of the fifth transistor T5 is electrically connected to the emission control line E(a)-1. While an emission control signal is supplied to the emission control line E(a)-1, the fifth transistor T5 is turned on, and the first power ELVDD is supplied to the first electrode of the driving transistor DT. When no emission control signal is supplied to the emission control line E(a)-1, the first power ELVDD is not supplied to the first electrode of the driving transistor DT, and thus the organic light emitting diode OLED(a, b) does not emit light.

[0052] A first electrode of the sixth transistor T6 is electrically connected to the second electrode of the driving transistor DT, a second electrode of the sixth transistor T6 is electrically connected to the anode "Anode" of the organic light emitting diode OLED(a, b), and a gate electrode of the sixth transistor T6 is electrically connected to the emission control line E(a)-1. While the emission control signal is supplied to the emission control line E(a)-1, the sixth transistor T6 is turned on, and the second electrode of the driving transistor DT is electrically connected to the anode. When no emission

control signal is supplied to the emission control line E(a)-1, a current flowing in the second electrode of the driving transistor DT does not reach the anode "Anode," and thus the organic light emitting diode OLED(a, b) does not emit light. As a result, only when the emission control signal is supplied to the emission control line E(a)-1, thereby turning on both of the fifth transistor T5 and the sixth transistor T6, the organic light emitting diode OLED(a, b) can emit light.

[0053] A first electrode of the seventh transistor T7 is electrically connected to the anode "Anode" of the organic light emitting diode OLED(a, b), the initialization power Vint is supplied to a second electrode of the seventh transistor T7, and a gate electrode of the seventh transistor T7 is electrically connected to the scan line S(a-k)-1 (k being an integer that is greater than 1). When the scan signal is supplied to the scan line S(a-k)-1, the seventh transistor T7 is turned on to supply the initialization power Vint to the anode "Anode." As a result, the organic light emitting diode OLED(a, b) does not emit light. The scan signal is supplied to the scan line S(a)-1 after the scan signal is supplied to the scan line S(a-k)-1. Further, when k is 1, a time at which the scan signal is supplied to the scan line S(a-1)-1 corresponds to a time at which the scan signal is supplied to the scan line S(a-k)-1.

[0054] The first power ELVDD is supplied to a first end of the storage capacitor Cst, and a second end of the storage capacitor Cst is electrically connected to the gate electrode of the driving transistor DT. The storage capacitor Cst maintains a voltage difference between the first power ELVDD and the gate electrode of the driving transistor DT.

[0055] A driving method of the pixel P(a, b) will be described in detail. Since it is assumed that the pixel P(a, b) is driven, it may be assumed that the level of a voltage supplied through the data line Db is equal to or greater than a given voltage level (e.g., 2 V). As a result, the first transistor T1 maintains a turn-off state. In this regard, for the convenience of description, k is assumed to be 1.

[0056] While a scan signal is supplied to the scan line S(a-1)-1, no emission control signal is supplied to the emission control line E(a)-1. Accordingly, the first, second, third, fifth and sixth transistors T1, T2, T3, T5, and T6 are turned off, and the fourth and seventh transistors T4 and T7 are turned on. The initialization power Vint is supplied to the anode "Anode" and to the gate electrode of the driving transistor DT. Accordingly, the organic light emitting diode OLED(a, b) does not emit light.

[0057] Even when the supply of the scan signal to the scan line S(a-1)-1 is stopped, and while the scan signal is supplied to the scan line S(a)-1, the emission control signal is not supplied to the emission control line E(a)-1. Accordingly, the first, fourth, fifth, sixth and seventh transistors T1, T4, T5, T6, and T7 are turned off, and the second and third transistors T2 and T3 are turned on. A data voltage from the data line Db is supplied to the first electrode of the driving transistor DT, and the level of a voltage of the gate electrode of the driving transistor DT is increased until a voltage difference between the gate electrode of the driving transistor DT and the data voltage from the data line Db reaches a threshold voltage of the driving transistor DT.

[0058] The emission control signal is supplied to the emission control line E(a)-1 after the supply of the scan signal to the scan line S(a)-1 is stopped. The first, second, third, fourth, seventh transistors T1, T2, T3, T4 and T7 are turned off, and the fifth and sixth transistors T5 and T6 are turned on. The first power ELVDD is supplied to the first electrode of the driving transistor DT, and the second electrode of the driving transistor DT is electrically connected to the anode "Anode." The level of a current flowing in the organic light emitting diode OLED(a, b) may be controlled by the driving transistor DT, and may be calculated by using Equation 1.

Equation 1

$$I_{ds} = k(V_{gs} - V_{th})^2$$

I_{ds}: the level of the current flowing between the first electrode and the second electrode of the driving transistor DT, k: a proportional factor, V_{gs}: a difference between the gate electrode of the driving transistor DT and the voltage level of the first electrode, and V_{th}: the threshold voltage of the driving transistor DT.

[0059] However, while the scan signal is supplied to the scan line S(a)-1, the voltage difference between the gate electrode of the driving transistor DT and the data voltage from the data line Db reaches the threshold voltage of the driving transistor DT. Accordingly, Equation 1 is represented by Equation 2.

Equation 2

$$I_{ds} = k\{(ELVDD - (V_{data} - V_{th})) - V_{th}\}^2 = k\{ELVDD - V_{data}\}^2$$

I_{ds}: the level of the current flowing between the first electrode and the second electrode of the driving transistor DT, k: the proportional factor, ELVDD: a voltage level of the first power ELVDD, V_{data}: a level of the data voltage supplied to

the data line Db, and Vth: a threshold voltage of the driving transistor DT.

[0060] Because luminance of light emitted from the organic light emitting diode OLED(a, b) is proportional to the level of a supplied current, the organic light emitting diode OLED(a, b) may emit light regardless of the threshold voltage Vth of the driving transistor DT.

[0061] In the case where the first display area 100-1 is requested to display black, when the level of the data voltage supplied through the data line Db is lower than a given voltage level (e.g., 0 V), the first transistor T1 is turned on to keep the organic light emitting diode OLED(a, b) from emitting light. As a result, although the first signal driver 240-1 and the second transistor T2 to the seventh transistor T7 included in the pixel P(a,b) are not driven, the first display area 100-1 can display black.

[0062] In the case where the first transistor T1 is omitted, when the first display area 100-1 is to display black, a black signal is transmitted from the data line Db, and a signal is delivered to the scan lines S(a)-1, S(a-1)-1, S(a-k)-1 and the emission control line E(a)-1. Accordingly, in the case of the data driver 230, the first signal driver 240-1, and the second signal driver 240-2, more power is consumed, because the second signal driver 240-2 is required to be driven when it is difficult for the first signal driver 240-1 to smoothly transmit signals to the first display area 100-1 alone.

[0063] FIG. 3 is a view for describing another example of a structure of pixels included in the display panel of FIG. 1.

[0064] The pixel P(a, b)' of the present embodiment includes an organic light emitting diode OLED(a, b)', and a driving circuit DC(a, b)' for supplying a current to the organic light emitting diode OLED(a, b)', and the driving circuit DC(a, b)' includes a driving transistor DT', first and second transistors T1' and T2', and a storage capacitor Cst'. The organic light emitting diode OLED(a, b)' includes an anode Anode' and a cathode Cathode'. The pixel P(a, b)' is electrically connected to the data line Db, the scan line S(a)-1, and may be connected to the emission control line E(a)-1(not shown). The driving transistor DT', the first transistor T1', and the second transistor T2' may each be a pMOS transistor, although this is merely an example. Alternatively, the driving transistor DT' and the first and second transistors T1' to T2' may be nMOS transistors.

[0065] The driving transistor DT' controls the level of a current flowing in the organic light emitting diode OLED(a, b)' based on the level of a voltage supplied to the data line Db that is electrically connected to the pixel P(a, b)'. Specifically, the first power ELVDD is supplied to the first electrode of the driving transistor DT', and the second electrode of the driving transistor DT' is electrically connected to the anode Anode'. In this regard, for convenience of description, the first electrode of the driving transistor DT' may serve as the source electrode, and the second electrode of the driving transistor DT' may serve as the drain electrode. However, this is merely an example. According to types of the transistors, it may be determined whether the first electrode serves as the source electrode or the drain electrode, and whether the second electrode serves as the drain electrode or the source electrode. A method by which the driving transistor DT' controls the level of a current flowing in the organic light emitting diode OLED(a, b)' will be described in detail later.

[0066] A first electrode of the first transistor T1' is electrically connected to the anode Anode' of the organic light emitting diode OLED(a, b)', the initialization power Vint is supplied to a second electrode of the first transistor T1', and a gate electrode of the first transistor T1 is electrically connected to the data line Db. When the level of a data voltage supplied to the data line Db is equal to or lower than a given voltage level (e.g., 0 V), the first transistor T1' is turned on to supply the initialization power Vint to the anode Anode' of the organic light emitting diode OLED(a, b)', and the organic light emitting diode OLED(a, b)' does not emit light as a result.

[0067] A first electrode of the second transistor T2' is electrically connected to the data line Db, a second electrode of the second transistor T2' is electrically connected to the first electrode of the driving transistor DT', and a gate electrode of the second transistor T2' is electrically connected to the scan line S(a)-1. When a scan signal is supplied to the scan line S(a)-1, the second transistor T2' is turned on to supply a data voltage from the data line Db to the first electrode of the driving transistor DT'.

[0068] The first power ELVDD is supplied to a first end of the storage capacitor Cst', and a second end of the storage capacitor Cst' is electrically connected to a gate electrode of the driving transistor DT'. The storage capacitor Cst' maintains a difference between the first power ELVDD and the gate electrode of the driving transistor DT'.

[0069] A driving method of the pixel P(a, b)' will be described in detail. Because it is assumed that the pixel P(a, b)' is driven, it may be assumed that the level of a voltage supplied through the data line Db is equal to or greater than a given voltage level (e.g., 2 V). As a result, the first transistor T1' maintains a turn-off state.

[0070] While a scan signal is supplied to the scan line S(a)-1, the second transistor T2' is turned on to supply the data voltage from the data line Db to the gate electrode of the driving transistor DT'. Although the supply of the scan signal to the scan line S(a)-1 is stopped, the storage capacitor Cst' maintains a voltage between the first electrode and the gate electrode of the driving transistor DT' until a next frame. A current which flows from the first power ELVDD through the driving transistor DT' flows in the organic light emitting diode OLED(a, b)'. Accordingly, the level of a current flowing in the organic light emitting diode OLED(a, b)' may be controlled by the driving transistor DT', and may be calculated by using Equation 3.

Equation 3

$$I_{ds} = k\{(ELVDD - V_{data}) - V_{th}\}^2 = k\{ELVDD - V_{data} - V_{th}\}^2$$

5 I_{ds} : the level of the current flowing between the first electrode and the second electrode of the driving transistor DT', k: a proportional factor, ELVDD: a voltage level of the first power ELVDD, V_{data} : a level of the data voltage supplied to the data line Db, and V_{th} : a threshold voltage of the driving transistor DT'.

10 **[0071]** Because luminance of light emitted from the organic light emitting diode OLED(a, b)' is proportional to the level of a supplied current, the pixel P(a, b)' illustrated in FIG. 3 has a simple circuit structure, but is affected by the threshold voltage V_{th} of the driving transistor DT'. Also, in the embodiment of FIG. 3, although no signal is supplied to the scan line S(a)-1 and the emission control line E(a)-1, when the data voltage from the data line Db is lower than a predetermined level, the pixel P(a, b)' included in the organic light emitting display device emits no light. As a result, the first signal driver 240-1 may be not driven, thereby reducing power consumption.

15 **[0072]** FIG. 4 is a flowchart for describing a driving method of an organic light emitting display device according to an embodiment of the present invention. Hereinafter, a driving method of the organic light emitting display device will be described with reference to FIG. 1 to FIG. 4.

[0073] At S1100, it is determined whether a first display area 100-1 of the display panel 100 is used. Details of S1100 will be described later with reference to FIG. 5.

20 **[0074]** At S1200, when it is determined that the first display area 100-1 is used, S1300 is executed. When it is determined that the first display area 100-1 is not used, S1400 is executed.

[0075] At S1300, the first display area 100-1 and the second display area 100-2 are driven. The timing controller 220 determines that the first display area 100-1 is used, and the data driver 230 receives a use-determining signal "Use" having the first logic value. Details of S1300 will be described later with reference to FIG. 6.

25 **[0076]** At S1400, the first display area 100-1 is not driven, and the second display area 100-2 is driven. The timing controller 220 determines that the first display area 100-1 is not used, and data driver 230 receives a use-determining signal "Use" having the second logic value. Details of S1400 will be described later with reference to FIG. 7.

[0077] FIG. 5 is a flowchart for describing a method of determining whether a first display area is used in the driving method of the organic light emitting display device of FIG. 4. Hereinafter, S1100 will be described with reference to FIG. 1, FIG. 2, FIG. 4, and FIG. 5.

30 **[0078]** At S1110, it is determined whether the timing controller 220 receives the externally supplied use-determining signal "Use." In the case of receiving the use-determining signal, S1120 is executed. In the case of not receiving the use-determining signal, S1130 is executed.

35 **[0079]** At S1120, it is determined based on the use-determining signal "Use" that the first display area 100-1 is used. When the use-determining signal "Use" received by the timing controller 220 has the first logic value, the timing controller 220 determines that the first display area 100-1 is used. When the use-determining signal "Use" received by the timing controller 220 has the second logic value, which is different from the first logic value, then the timing controller 220 determines that the first display area 100-1 is not used.

40 **[0080]** At S1130, it is determined based on image signals RGB that the first display area 100-1 is used. When at least a portion of the image signals corresponding to a first display area among the image signals RGB do not correspond to black grays, then the display panel driver 200 determines that the first display area 100-1 is used. In contrast, when all of the image signals corresponding to a first display area among the image signals RGB correspond to the black grays, the display panel driver 200 determines that the first display area 100-1 is not used.

45 **[0081]** FIG. 6 is a flowchart for describing a method of driving a first display area and a second display area in the driving method of organic light emitting display device of FIG. 4. Hereinafter, S1300 will be described with reference to FIG. 1 to FIG. 6.

[0082] At S1310, the data driver 230, which receives the use-determining signal "Use" having the first logic value, supplies data voltages corresponding to the received image signals RGB. The data voltages are supplied to the pixels P through the data lines D.

50 **[0083]** At S1320, the timing controller 220 respectively supplies the first scan timing control signal SCS1 and the second scan timing control signal SCS2 to the first signal driver 240-1 and the second signal driver 240-2, respectively. When the display panel 100 includes the emission control lines E, the first emission timing control signal ECS1 and the second emission timing control signal ECS2 are additionally respectively supplied to the first signal driver 240-1 and the second signal driver 240-2.

55 **[0084]** At S1330, the bridge transistors BT are turned on. The data driver 230, which receives the use-determining signal "Use" having the first logic value, turns on the bridge transistors BT by supplying a voltage of a level that is lower than a given voltage level to the bridge transistor control line BTC in response to the use-determining signal "Use".

[0085] FIG. 7 is a flowchart for describing a method of driving a first display area and a second display area in the

driving method of organic light emitting display device of FIG. 4.

[0086] At S1410, the data driver 230, which receives the use-determining signal "Use" having the second logic value, supplies a data voltage of a voltage level that is lower than a given voltage level to the data lines D-1 corresponding to the first display area 100-1. The level of the data voltage supplied to the data lines D-1 is unrelated to the received image signals RGB. The data voltages corresponding to the image signals RGB are supplied to the data lines D-2 corresponding to the second display area 100-2.

[0087] At S1420, the timing controller 220 stops the driving of the first signal driver 240-1 and drives the second signal driver 240-2. The timing controller supplies the second scan timing control signal SCS2 to the second signal driver 240-2. When the display panel 100 includes the emission control lines E, the second emission timing control signal ECS2 is supplied to the second signal driver 240-2.

[0088] At 1430, the bridge transistors BT are turned off. The data driver 230, which receives the use-determining signal "Use" having the second logic value, turns off the bridge transistors BT by supplying a voltage level that is higher than the given voltage level to the bridge transistor control line BTC in response to the use-determining signal "Use." By the action of S1430, the scan lines S-2 for driving the second display area 100-2 and the emission control signals and the scan signals supplied to the emission control lines E-2 and the scan lines S-2 do not flow in the first display area 100-1. As a result, when the second display area 100-2 is exclusively driven, the scan lines S-2 for driving the second display area 100-2 and the emission control lines E-2 do not cause the first pixels P-1 to malfunction.

[0089] By the action of S1400, the first signal driver 240-1 might not be driven, thereby reducing a power consumption. Although the scan signals and emission control signals are not supplied to the first pixels P-1, the data voltage level that is lower than the given voltage level is supplied to the first data lines D-1, and thus the first pixels P-1 do not emit light.

[0090] Example embodiments of the invention have been disclosed herein and although specific terms are employed, they are used and are to be interpreted in a generic and descriptive sense only and not for purpose of limitation. In some instances, as would be apparent to one of ordinary skill in the art as of the filing of the present application, features, characteristics and/or elements described in connection with a particular embodiment may be used singly or in combination with features, characteristics and/or elements described in connection with other embodiments unless otherwise specifically indicated. Accordingly, it will be understood by those of skill in the art that various changes in form and details may be made without departing from the scope of the present invention as set forth in the following claims.

Claims

1. A pixel comprising:

an organic light emitting diode (OLED); and

a driving circuit (DC) configured to supply current to the organic light emitting diode, the driving circuit comprising:

a driving transistor (DT) configured to control a level of the current flowing in the organic light emitting diode based on a level of a voltage supplied to a data line;

an initialization power supply terminal (V_{int});

a first power terminal (ELVDD);

a second transistor (T2) comprising a first electrode electrically connected to the data line, a second electrode electrically connected to a first electrode of the driving transistor, and a gate electrode electrically connected to a first scan line;

a third transistor (T3) comprising a first electrode electrically connected to a second electrode of the driving transistor, a second electrode electrically connected to a gate electrode of the driving transistor, and a gate electrode electrically connected to the first scan line;

a fourth transistor (T4) comprising a first electrode electrically connected to the gate electrode of the driving transistor, a second electrode electrically connected to the initialization power supply terminal, and a gate electrode electrically connected to a second scan line;

a fifth transistor (T5) comprising a first electrode electrically connected to the first power supply terminal, a second electrode electrically connected to the first electrode of the driving transistor, and a gate electrode electrically connected to an emission control line;

a sixth transistor (T6) comprising a first electrode electrically connected to the second electrode of the driving transistor, a second electrode electrically connected to the anode of the organic light emitting diode, and a gate electrode electrically connected to the emission control line;

a seventh transistor (T7) comprising a first electrode electrically connected to the anode of the organic light emitting diode, a second electrode electrically connected to the initialization power supply terminal, and a gate electrode electrically connected to a third scan line; and

a storage capacitor (C_{st}) comprising a first end electrically connected to the first power supply terminal , and a second end electrically connected to the gate electrode of the driving transistor,

characterized in that the pixel further comprises a first transistor (T1) comprising a first electrode electrically connected to an anode of the organic light emitting diode, a second electrode electrically connected to the initialization power supply terminal, and a gate electrode electrically connected to the data line (Db), wherein the first transistor is configured to control the supply of the initialization power to the anode of the organic light emitting diode such that when the first transistor is turned on the organic light emitting diode does not emit light.

2. An organic light emitting display device comprising:

a display panel having a first display area and a second display area that do not overlap each other, wherein at least one of the first display area and the second display area comprises at least one pixel according to claim 1, wherein a cathode of the organic light emitting diode is configured to receive a second power having a second voltage level that is lower than a first voltage level of the first power, and a signal driver adapted to supply to the pixel: a scan signal to the second and third scan lines, followed by a scan signal to the first scan line.

3. An organic light emitting display device according to claim 2, wherein the first display area is flat, and the second display area is curved.

4. An organic light emitting display device according to claim 2 or 3, wherein the display panel further comprises bridge transistors connecting scan lines between the first display area and the second display area, and wherein the display is configured such that when the bridge transistors are switched off, the scan signals supplied to the second display area are not supplied to the first display area, and the scan signals supplied to the first display area are not supplied to the second display area.

5. An organic light emitting display device according to one of claims 2 to 4, wherein the display panel driver further comprises a timing controller that is configured to:

generate a data timing control signal and a scan timing control signal based on externally supplied image signals or timing signals;

output the image signals and the data timing control signal to the data driver;

drive the first signal driver and the second signal driver, and output the scan timing control signal to the first signal driver and the second signal driver, when a use-determining signal having a first logic value is received; and drive the second signal driver, and output the scan timing control signal to the second signal driver, when the use-determining signal having a second logic value that is different from the first logic value is received.

6. An organic light emitting display device according to claim 5, wherein the timing controller is further configured to:

generate an emission timing control signal;

output the emission timing control signal to the first signal driver and to the second signal driver when the use-determining signal having the first logic value is received; and

output a scan timing control signal and the emission timing control signal to the second signal driver when the use-determining signal having the second logic value is received.

7. A driving method of an organic light emitting display device comprising a display panel having a first display area and a second display area that do not overlap each other, wherein at least one of the first display area and the second display area comprises at least one pixel according to claim 1, and a display panel driver configured to drive the display panel, the method comprising:

determining (S1100) whether the first display area is used;

driving (S1300) the first display area and the second display area when it is determined that the first display area is used; and

driving (S1400) the second display area, but not the first display area, when it is determined that the first display area is not used.

8. A driving method according to claim 7, wherein the determining whether the first display area is used comprises:

receiving and analyzing a use-determining signal when the use-determining signal is received from the outside;
and
determining that the first display area is used when the use-determining signal has a first logic value; and
determining that the first display area is not used when the use-determining signal has a second logic value
that is different from the first logic value.

9. A driving method according to claim 7, wherein the determining whether the first display area is used comprises:

receiving and analyzing image signals when the use-determining signal is not received from the outside; and
determining that the first display area is used when at least one of the image signals corresponding to the first
display area does not correspond to black grays; and
determining that the first display area is not used when all of the image signals corresponding to the first display
area corresponds to black grays.

10. A driving method according to any of claims 7 to 9, wherein the display panel further comprises:

bridge transistors between the first display area and the second display area,
scan lines configured to transfer scan signals;
data lines configured to transfer data voltages; and
pixels in the first display area or the second display area and electrically connected to the scan lines and the
data lines,
wherein the display panel driver comprises:

a data driver configured to generate the data voltages based on received image signals;
a first signal driver configured to generate scan signals supplied to the first display area; and
a second signal driver configured to generate scan signals supplied to the second display area, and

wherein the driving of the second display area comprises:

supplying data voltages having voltage levels that are lower than a given voltage level to data lines corre-
sponding to the first display area;
stopping the driving of the first signal driver; and
turning off the bridge transistors.

Patentansprüche

1. Pixel, umfassend:

eine organische lichtemittierende Diode (OLED); und
eine Treiberschaltung (DC), die dazu konfiguriert ist, der organischen lichtemittierenden Diode Strom zuzufüh-
ren, wobei die Treiberschaltung umfasst:

einen Treibertransistor (DT), der dazu konfiguriert ist, einen Pegel des in der organischen lichtemittierenden
Diode fließenden Stroms basierend auf einem Pegel einer Datenleitung zugeführten Spannung zu
steuern;

eine Initialisierungs-Stromversorgungsklemme (V_{int});

eine erste Stromklemme (ELVDD);

einen zweiten Transistor (T2), umfassend eine erste Elektrode, die mit der Datenleitung elektrisch verbun-
den ist, eine zweite Elektrode, die mit einer ersten Elektrode des Treibertransistors elektrisch verbunden
ist, und eine Gate-Elektrode, die mit einer ersten Abtastleitung elektrisch verbunden ist;

einen dritten Transistor (T3), umfassend eine erste Elektrode, die mit einer zweiten Elektrode des Treiber-
transistors elektrisch verbunden ist, eine zweite Elektrode, die mit einer Gate-Elektrode des Treibertran-
sistors elektrisch verbunden ist, und eine Gate-Elektrode, die mit der ersten Abtastleitung elektrisch ver-
bunden ist;

einen vierten Transistor (T4), der eine erste Elektrode umfasst, die mit der Gate-Elektrode des Treibertran-
sistors elektrisch verbunden ist, eine zweite Elektrode, die mit der Initialisierungs-Stromversorgungsklemme
elektrisch verbunden ist, und eine Gate-Elektrode, die mit einer zweiten Abtastleitung elektrisch verbunden

ist;

einen fünften Transistor (T5), umfassend eine erste Elektrode, die mit der ersten Stromversorgungsklemme elektrisch verbunden ist, eine zweite Elektrode, die mit der ersten Elektrode des Treibertransistors elektrisch verbunden ist, und eine Gate-Elektrode, die mit einer Emissionssteuerleitung elektrisch verbunden ist;

einen sechsten Transistor (T6), umfassend eine erste Elektrode, die mit der zweiten Elektrode des Treibertransistors elektrisch verbunden ist, eine zweite Elektrode, die mit der Anode der organischen lichtemittierenden Diode elektrisch verbunden ist, und eine Gate-Elektrode, die mit der Emissionssteuerleitung elektrisch verbunden ist;

einen siebten Transistor (T7), umfassend eine erste Elektrode, die mit der Anode der organischen lichtemittierenden Diode elektrisch verbunden ist, eine zweite Elektrode, die mit der Initialisierungs-Stromversorgungsklemme elektrisch verbunden ist, und eine Gate-Elektrode, die mit einer dritten Abtastleitung elektrisch verbunden ist; und

einen Speicherkondensator (C_{st}), umfassend ein erstes Ende, das mit der ersten Stromversorgungsklemme elektrisch verbunden ist, und ein zweites Ende, das mit der Gate-Elektrode des Treibertransistors elektrisch verbunden ist,

dadurch gekennzeichnet, dass das Pixel ferner einen ersten Transistor (T1) umfasst, der eine erste Elektrode umfasst, die mit einer Anode der organischen lichtemittierenden Diode elektrisch verbunden ist, eine zweite Elektrode, die mit der Initialisierungs-Stromversorgungsklemme elektrisch verbunden ist, und eine Gate-Elektrode, die mit der Datenleitung (Db) elektrisch verbunden ist,

wobei der erste Transistor dazu konfiguriert ist, die Versorgung der Anode der organischen lichtemittierenden Diode mit Initialisierungsstrom so zu steuern, dass die organische lichtemittierende Diode beim Einschalten des ersten Transistors kein Licht emittiert.

2. Organische lichtemittierende Anzeigevorrichtung, umfassend:

ein Anzeigepanel mit einem ersten Anzeigebereich und einem zweiten Anzeigebereich, die sich nicht miteinander überlappen, wobei mindestens einer vom ersten Anzeigebereich und dem zweiten Anzeigebereich mindestens ein Pixel nach Anspruch 1 umfasst, wobei eine Kathode der organischen lichtemittierenden Diode dazu konfiguriert ist, eine zweite Leistung mit einem zweiten Spannungspegel zu empfangen, der niedriger als ein erster Spannungspegel der ersten Leistung ist, und

einen Signaltreiber, der dazu angepasst ist, dem Pixel ein Abtastsignal an die zweite und dritte Abtastleitung, gefolgt von einem Abtastsignal an die erste Abtastleitung, zuzuführen.

3. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 2, wobei der erste Anzeigebereich flach ist und der zweite Anzeigebereich gekrümmt ist.

4. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 2 oder 3, wobei das Anzeigepanel ferner Brückentransistoren umfasst, die Abtastleitungen zwischen dem ersten Anzeigebereich und dem zweiten Anzeigebereich verbinden, und

wobei die Anzeige so konfiguriert ist, dass, beim Ausschalten der Brückentransistoren, die dem zweiten Anzeigebereich zugeführten Abtastsignale nicht dem ersten Anzeigebereich zugeführt werden und die dem ersten Anzeigebereich zugeführten Abtastsignale nicht dem zweiten Anzeigebereich zugeführt werden.

5. Organische lichtemittierende Anzeigevorrichtung nach einem der Ansprüche 2 bis 4, wobei der Anzeigepaneltreiber ferner eine Zeitsteuerung umfasst, die konfiguriert ist zum:

Erzeugen eines Datenzeitsteuersignals und eines Abtastzeitsteuersignals basierend auf extern gelieferten Bildsignalen oder Zeitsignalen;

Ausgabe der Bildsignale und des Datenzeitsteuersignals an den Datentreiber;

Ansteuern des ersten Signaltreibers und des zweiten Signaltreibers und Ausgeben des Abtastzeitsteuersignals an den ersten Signaltreiber und den zweiten Signaltreiber, wenn ein nutzungsbestimmendes Signal mit einem ersten Logikwert empfangen wird; und

Ansteuern des zweiten Signaltreibers und Ausgeben des Abtastzeitsteuersignals an den zweiten Signaltreiber, wenn das benutzungsbestimmende Signal mit einem zweiten Logikwert, der sich vom ersten Logikwert unterscheidet, empfangen wird.

6. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 5, wobei die Zeitsteuerung ferner konfiguriert ist zum:

Erzeugen eines Emissionszeitsteuerungssignals;

Ausgeben des Emissionszeitsteuerungssignals an den ersten Signaltreiber und an den zweiten Signaltreiber, wenn das nutzungsbestimmende Signal mit dem ersten Logikwert empfangen wird; und

Ausgeben eines Abtastzeitsteuersignals und des Emissionszeitsteuersignals an den zweiten Signaltreiber, wenn das nutzungsbestimmende Signal mit dem zweiten Logikwert empfangen wird.

7. Ansteuerungsverfahren einer organischen lichtemittierenden Anzeigevorrichtung, die ein Anzeigefeld mit einem ersten Anzeigebereich und einem zweiten Anzeigebereich umfasst, die sich nicht miteinander überlappen, wobei mindestens eines von dem ersten Anzeigebereich und dem zweiten Anzeigebereich mindestens ein Pixel nach Anspruch 1 umfasst, und einen Anzeigepaneltreiber, der dazu konfiguriert ist, das Anzeigepanel zu steuern, wobei das Verfahren umfasst:

Bestimmen (S1100), ob der erste Anzeigebereich verwendet wird;

Ansteuern (S1300) des ersten Anzeigebereichs und des zweiten Anzeigebereichs, wenn bestimmt wird, dass der erste Anzeigebereich verwendet wird; und

Ansteuern (S1400) des zweiten Anzeigebereichs, aber nicht des ersten Anzeigebereichs, wenn bestimmt wird, dass der erste Anzeigebereich nicht verwendet wird.

8. Ansteuerungsverfahren nach Anspruch 7, wobei das Bestimmen, ob der erste Anzeigebereich verwendet wird, umfasst:

Empfangen und Analysieren eines nutzungsbestimmenden Signals, wenn das nutzungsbestimmende Signal von außen empfangen wird; und

Bestimmen, dass der erste Anzeigebereich verwendet wird, wenn das nutzungsbestimmende Signal einen ersten Logikwert aufweist; und

Bestimmen, dass der erste Anzeigebereich nicht verwendet wird, wenn das nutzungsbestimmende Signal einen zweiten Logikwert aufweist, der sich vom ersten Logikwert unterscheidet.

9. Ansteuerungsverfahren nach Anspruch 7, wobei das Bestimmen, ob der erste Anzeigebereich verwendet wird, umfasst:

Empfangen und Analysieren von Bildsignalen, wenn das nutzungsbestimmende Signal nicht von außen empfangen wird; und

Bestimmen, dass der erste Anzeigebereich verwendet wird, wenn mindestens eines der Bildsignale, die dem ersten Anzeigebereich entsprechen, nicht den schwarzen Grautönen entspricht; und

Bestimmen, dass der erste Anzeigebereich nicht verwendet wird, wenn alle der Bildsignale, die dem ersten Anzeigebereich entsprechen, schwarzen Grautönen entsprechen.

10. Ansteuerungsverfahren nach einem der Ansprüche 7 bis 9, wobei das Anzeigepanel ferner umfasst:

Brückentransistoren zwischen dem ersten Anzeigebereich und dem zweiten Anzeigebereich,

Abtastleitungen, die dazu konfiguriert sind, Abtastsignale zu übertragen;

Datenleitungen, die zum Übertragen von Datenspannungen konfiguriert sind; und

Pixel im ersten Anzeigebereich oder im zweiten Anzeigebereich, die elektrisch mit den Abtastleitungen und den Datenleitungen verbunden sind,

wobei der Anzeigepaneltreiber umfasst:

einen Datentreiber, der dazu konfiguriert ist, die Datenspannungen basierend auf empfangenen Bildsignalen zu erzeugen;

einen ersten Signaltreiber, der dazu konfiguriert ist, Abtastsignale zu erzeugen, die dem ersten Anzeigebereich zugeführt werden; und

einen zweiten Signaltreiber, der dazu konfiguriert ist, Abtastsignale zu erzeugen, die dem zweiten Anzeigebereich zugeführt werden, und

wobei das Ansteuern des zweiten Anzeigebereichs umfasst:

Zuführen von Datenspannungen mit Spannungspegeln, die niedriger als ein vorgegebener Spannungspegel sind, zu Datenleitungen, die dem ersten Anzeigebereich entsprechen;

Beenden der Ansteuerung des ersten Signaltreibers; und
Abschalten der Brückentransistoren.

5 Revendications

1. Pixel comprenant :

une diode à émission de lumière organique (OLED) ; et
un circuit de pilotage (DC) qui est configuré de manière à ce qu'il alimente un courant sur la diode à émission de lumière organique, le circuit de pilotage comprenant :

un transistor de pilotage (DT) qui est configuré de manière à ce qu'il commande un niveau du courant qui circule dans la diode à émission de lumière organique sur la base d'un niveau d'une tension qui est alimentée sur une ligne de données ;

une borne d'alimentation en puissance d'initialisation (Vint) ;

une première borne d'alimentation en puissance (ELVDD) ;

un deuxième transistor (T2) qui comprend une première électrode qui est connectée électriquement à la ligne de données, une seconde électrode qui est connectée électriquement à une première électrode du transistor de pilotage et une électrode de grille qui est connectée électriquement à une première ligne de balayage ;

un troisième transistor (T3) qui comprend une première électrode qui est connectée électriquement à une seconde électrode du transistor de pilotage, une seconde électrode qui est connectée électriquement à une électrode de grille du transistor de pilotage et une électrode de grille qui est connectée électriquement à la première ligne de balayage ;

un quatrième transistor (T4) qui comprend une première électrode qui est connectée électriquement à l'électrode de grille du transistor de pilotage, une seconde électrode qui est connectée électriquement à la borne d'alimentation en puissance d'initialisation et une électrode de grille qui est connectée électriquement à une deuxième ligne de balayage ;

un cinquième transistor (T5) qui comprend une première électrode qui est connectée électriquement à la première borne d'alimentation en puissance, une seconde électrode qui est connectée électriquement à la première électrode du transistor de pilotage et une électrode de grille qui est connectée électriquement à une ligne de commande d'émission ;

un sixième transistor (T6) qui comprend une première électrode qui est connectée électriquement à la seconde électrode du transistor de pilotage, une seconde électrode qui est connectée électriquement à l'anode de la diode à émission de lumière organique et une électrode de grille qui est connectée électriquement à la ligne de commande d'émission ;

un septième transistor (T7) qui comprend une première électrode qui est connectée électriquement à l'anode de la diode à émission de lumière organique, une seconde électrode qui est connectée électriquement à la borne d'alimentation en puissance d'initialisation et une électrode de grille qui est connectée électriquement à une troisième ligne de balayage ; et

un condensateur de stockage (C_{st}) qui comprend une première extrémité qui est connectée électriquement à la première borne d'alimentation en puissance et une seconde extrémité qui est connectée électriquement à l'électrode de grille du transistor de pilotage ;

caractérisé en ce que le pixel comprend en outre un premier transistor (T1) qui comprend une première électrode qui est connectée électriquement à une anode de la diode à émission de lumière organique, une seconde électrode qui est connectée électriquement à la borne d'alimentation en puissance d'initialisation et une électrode de grille qui est connectée électriquement à la ligne de données (Db) ;

dans lequel le premier transistor est configuré de manière à ce qu'il commande l'alimentation de la puissance d'initialisation sur l'anode de la diode à émission de lumière organique de telle sorte que lorsque le premier transistor est rendu passant, la diode à émission de lumière organique n'émette pas de la lumière.

2. Dispositif d'affichage à émission de lumière organique comprenant :

un panneau d'affichage qui comporte une première zone d'affichage et une seconde zone d'affichage qui ne se chevauchent pas l'une l'autre, dans lequel au moins une zone prise parmi la première zone d'affichage et la seconde zone d'affichage comprend au moins un pixel selon la revendication 1, dans lequel une cathode de la diode à émission de lumière organique est configurée de manière à ce qu'elle reçoive une seconde puissance

qui présente un second niveau de tension qui est inférieur à un premier niveau de tension de la première puissance ; et

un dispositif de pilotage de signal qui est adapté de manière à ce qu'il alimente sur le pixel : un signal de balayage sur les deuxième et troisième lignes de balayage, suivi par un signal de balayage sur la première ligne de balayage.

3. Dispositif d'affichage à émission de lumière organique selon la revendication 2, dans lequel la première zone d'affichage est plane et la seconde zone d'affichage est incurvée.

4. Dispositif d'affichage à émission de lumière organique selon la revendication 2 ou 3, dans lequel le panneau d'affichage comprend en outre des transistors de pont qui connectent des lignes de balayage entre la première zone d'affichage et la seconde zone d'affichage ; et dans lequel l'affichage est configuré de telle sorte que, lorsque les transistors de pont sont commutés dans l'état bloqué, les signaux de balayage qui sont alimentés sur la seconde zone d'affichage ne soient pas alimentés sur la première zone d'affichage et les signaux de balayage qui sont alimentés sur la première zone d'affichage ne soient pas alimentés sur la seconde zone d'affichage.

5. Dispositif d'affichage à émission de lumière organique selon l'une des revendications 2 à 4, dans lequel le dispositif de pilotage de panneau d'affichage comprend en outre un contrôleur de temporisation qui est configuré de manière à ce qu'il réalise les actions qui suivent :

la génération d'un signal de commande de temporisation de données et d'un signal de commande de temporisation de balayage sur la base de signaux d'image ou de signaux de temporisation alimentés de façon externe ; l'émission en sortie des signaux d'image et du signal de commande de temporisation de données sur le dispositif de pilotage de données ;

le pilotage du premier dispositif de pilotage de signal et du second dispositif de pilotage de signal et l'émission en sortie du signal de commande de temporisation de balayage sur le premier dispositif de pilotage de signal et sur le second dispositif de pilotage de signal, lorsqu'un signal de détermination d'utilisation qui présente une première valeur logique est reçu ; et

le pilotage du second dispositif de pilotage de signal et l'émission en sortie du signal de commande de temporisation de balayage sur le second dispositif de pilotage de signal lorsque le signal de détermination d'utilisation qui présente une seconde valeur logique qui est différente de la première valeur logique est reçu.

6. Dispositif d'affichage à émission de lumière organique selon la revendication 5, dans lequel le contrôleur de temporisation est en outre configuré de manière à ce qu'il réalise les actions qui suivent :

la génération d'un signal de commande de temporisation d'émission ;

l'émission en sortie du signal de commande de temporisation d'émission sur le premier dispositif de pilotage de signal et sur le second dispositif de pilotage de signal lorsque le signal de détermination d'utilisation qui présente la première valeur logique est reçu ; et

l'émission en sortie d'un signal de commande de temporisation de balayage et du signal de commande de temporisation d'émission sur le second dispositif de pilotage de signal lorsque le signal de détermination d'utilisation qui présente la seconde valeur logique est reçu.

7. Procédé de pilotage d'un dispositif d'affichage à émission de lumière organique qui comprend un panneau d'affichage qui comporte une première zone d'affichage et une seconde zone d'affichage qui ne se chevauchent pas l'une l'autre, dans lequel au moins une zone prise parmi la première zone d'affichage et la seconde zone d'affichage comprend au moins un pixel selon la revendication 1, et un dispositif de pilotage de panneau d'affichage qui est configuré de manière à ce qu'il pilote le panneau d'affichage, le procédé comprenant :

la détermination (S1100) de si oui ou non la première zone d'affichage est utilisée ;

le pilotage (S1300) de la première zone d'affichage et de la seconde zone d'affichage lorsqu'il est déterminé que la première zone d'affichage est utilisée ; et

le pilotage (S1400) de la seconde zone d'affichage, mais pas de la première zone d'affichage, lorsqu'il est déterminé que la première zone d'affichage n'est pas utilisée.

8. Procédé de pilotage selon la revendication 7, dans lequel la détermination de si oui ou non la première zone d'affichage est utilisée comprend :

la réception et l'analyse d'un signal de détermination d'utilisation lorsque le signal de détermination d'utilisation est reçu depuis l'extérieur ; et
la détermination du fait que la première zone d'affichage est utilisée lorsque le signal de détermination d'utilisation présente une première valeur logique ; et
la détermination du fait que la première zone d'affichage n'est pas utilisée lorsque le signal de détermination d'utilisation présente une seconde valeur logique qui est différente de la première valeur logique.

9. Procédé de pilotage selon la revendication 7, dans lequel la détermination de si oui ou non la première zone d'affichage est utilisée comprend :

la réception et l'analyse de signaux d'image lorsque le signal de détermination d'utilisation n'est pas reçu depuis l'extérieur ; et
la détermination du fait que la première zone d'affichage est utilisée lorsqu'au moins l'un des signaux d'image qui correspondent à la première zone d'affichage, ne correspond pas à des gris noirs ; et
la détermination du fait que la première zone d'affichage n'est pas utilisée lorsque tous les signaux d'image qui correspondent à la première zone d'affichage, correspondent à des gris noirs.

10. Procédé de pilotage selon l'une quelconque des revendications 7 à 9, dans lequel le panneau d'affichage comprend en outre :

des transistors de pont entre la première zone d'affichage et la seconde zone d'affichage ;
des lignes de balayage qui sont configurées de manière à ce qu'elles transfèrent des signaux de balayage ;
des lignes de données qui sont configurées de manière à ce qu'elles transfèrent des tensions de données ; et
des pixels dans la première zone d'affichage ou dans la seconde zone d'affichage qui sont connectés électriquement aux lignes de balayage et aux lignes de données ;
dans lequel le dispositif de pilotage de panneau d'affichage comprend :

un dispositif de pilotage de données qui est configuré de manière à ce qu'il génère les tensions de données sur la base de signaux d'image reçus ;
un premier dispositif de pilotage de signal qui est configuré de manière à ce qu'il génère des signaux de balayage qui sont alimentés sur la première zone d'affichage ; et
un second dispositif de pilotage de signal qui est configuré de manière à ce qu'il génère des signaux de balayage qui sont alimentés sur la seconde zone d'affichage ; et

dans lequel le pilotage de la seconde zone d'affichage comprend :

l'alimentation de tensions de données qui présentent des niveaux de tension qui sont inférieurs à un niveau de tension donné sur des lignes de données qui correspondent à la première zone d'affichage ;
l'arrêt du pilotage du premier dispositif de pilotage de signal ; et
le passage à l'état bloqué des transistors de pont.

FIG. 1

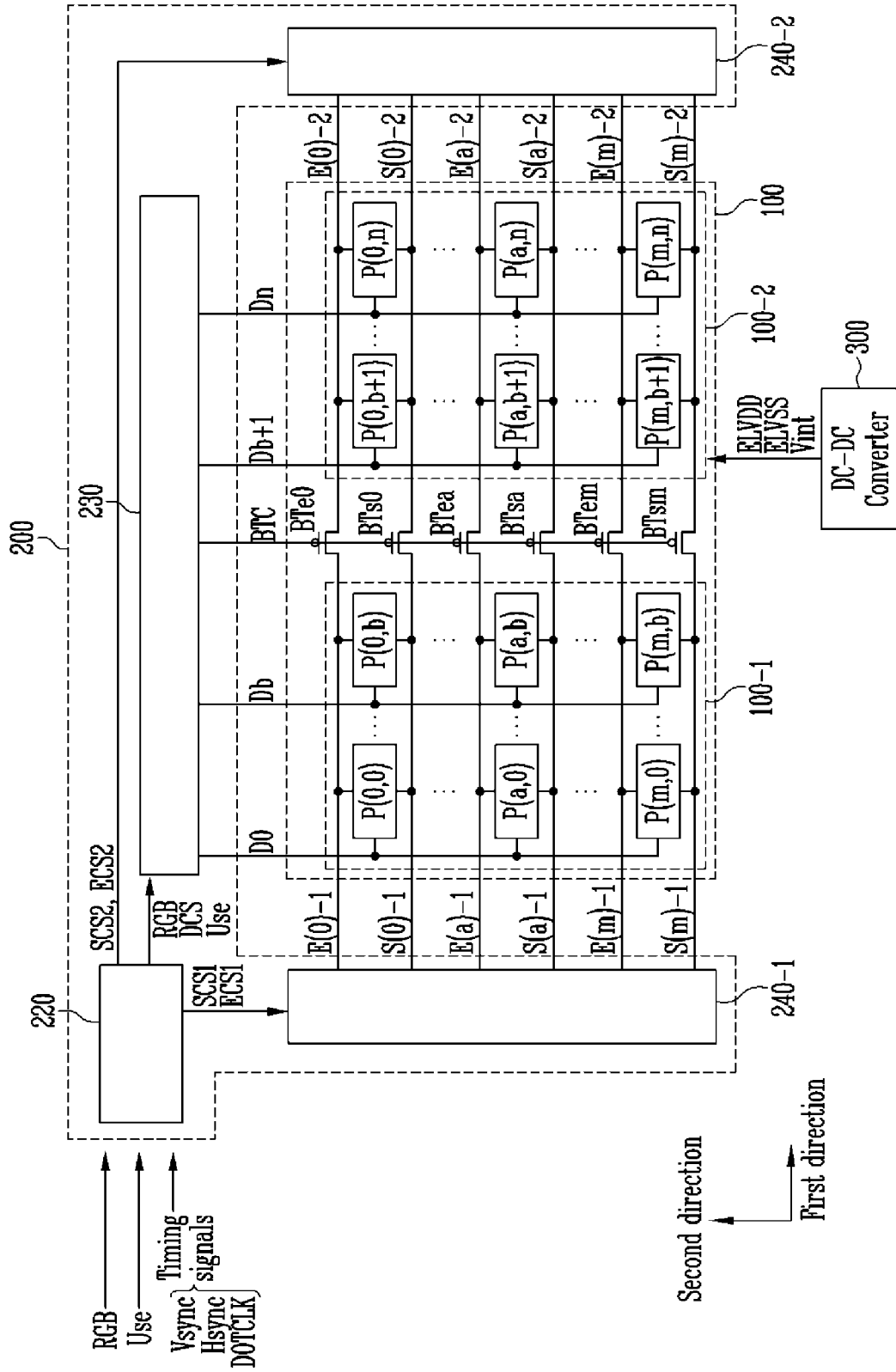


FIG. 2

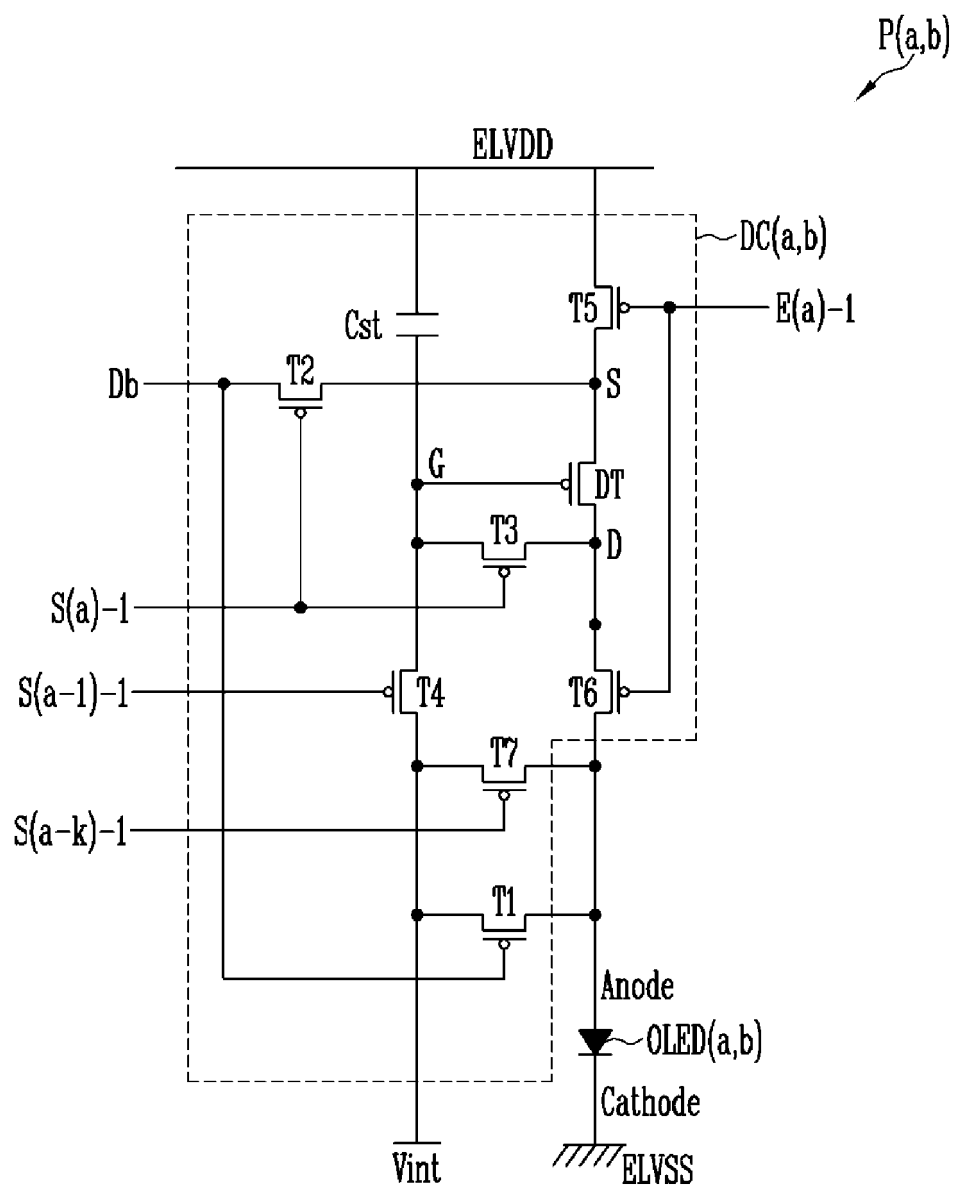


FIG. 3

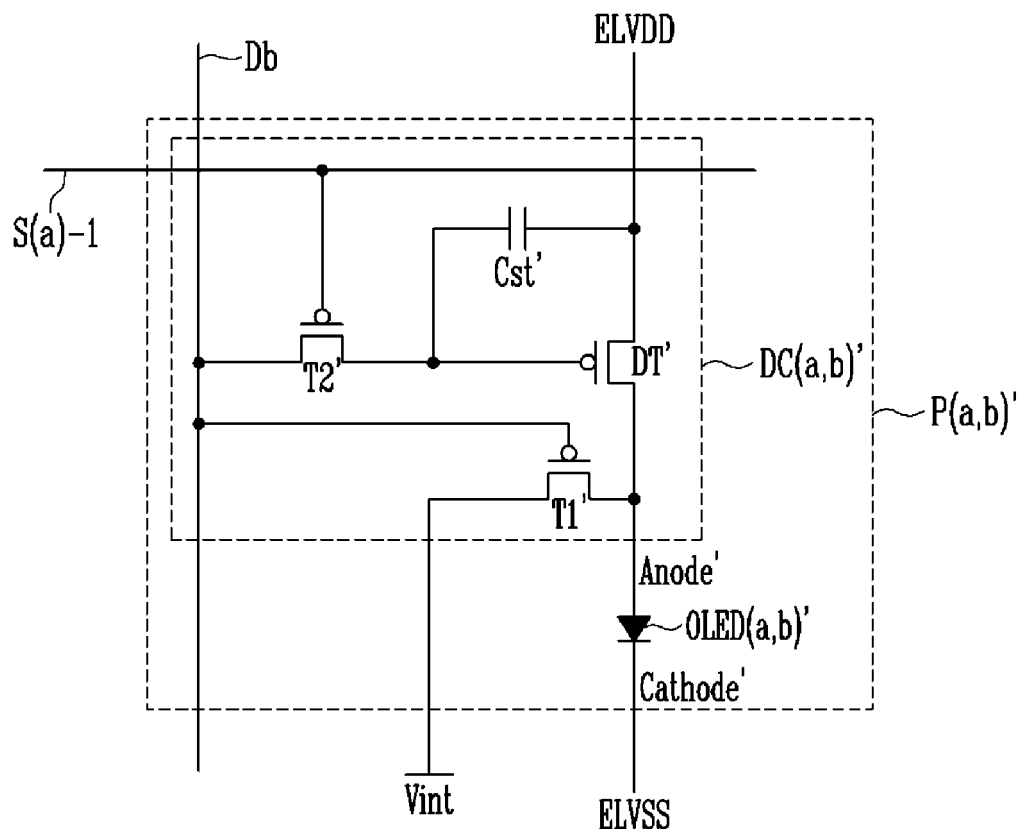


FIG. 4

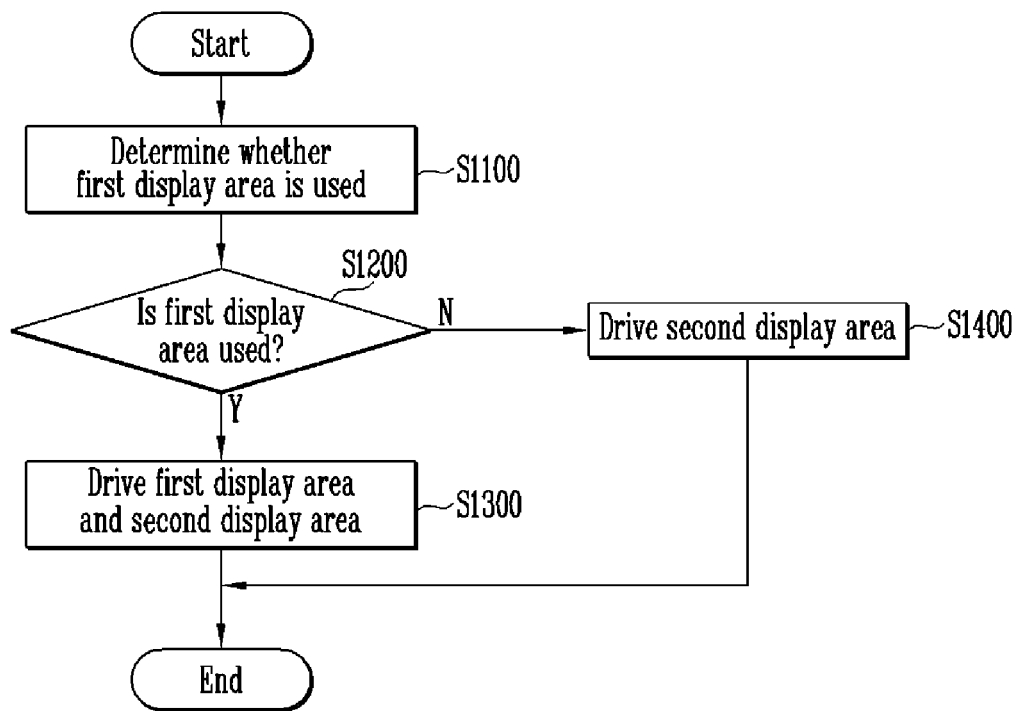


FIG. 5

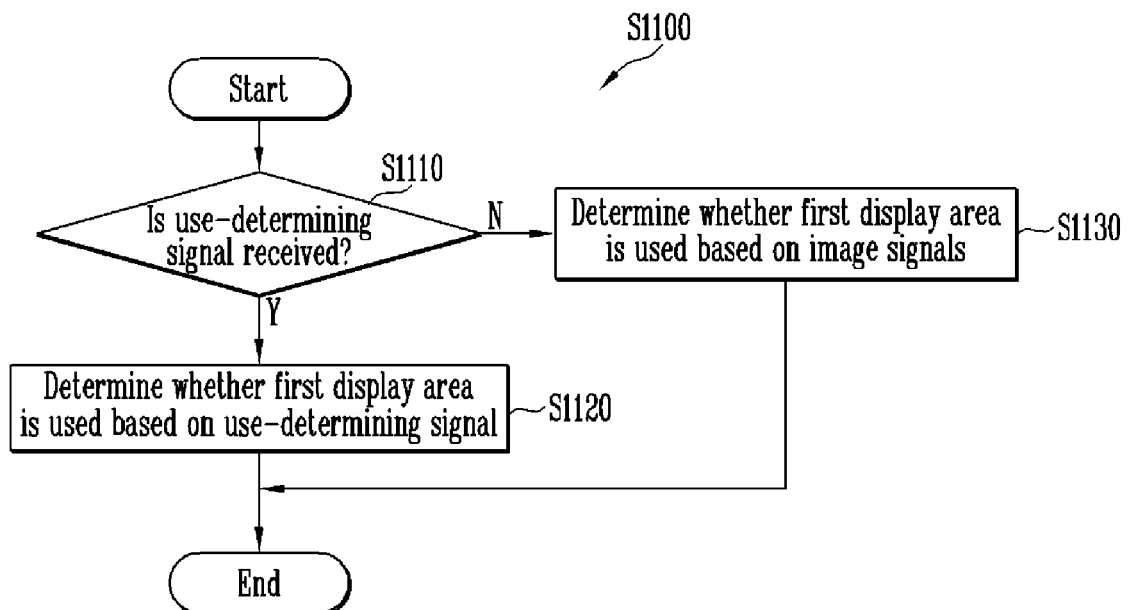


FIG. 6

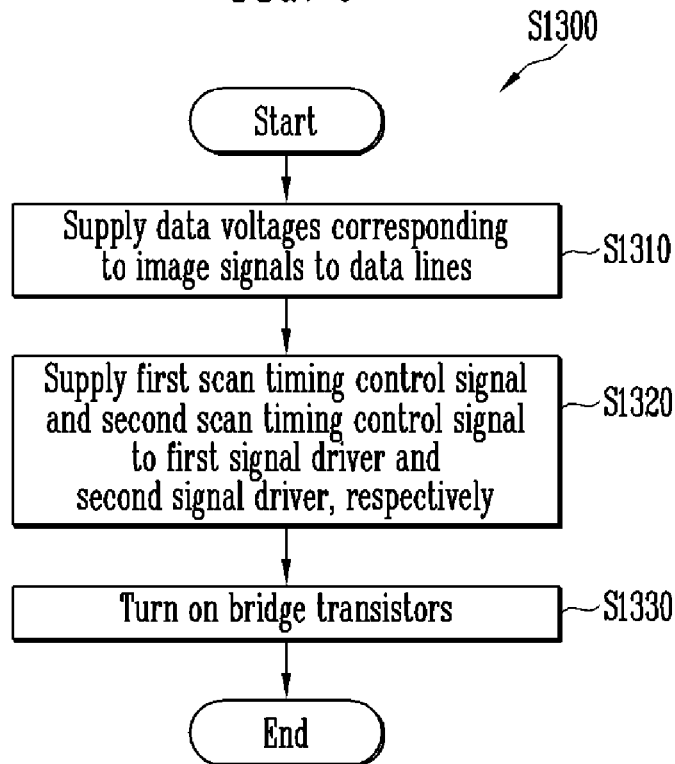
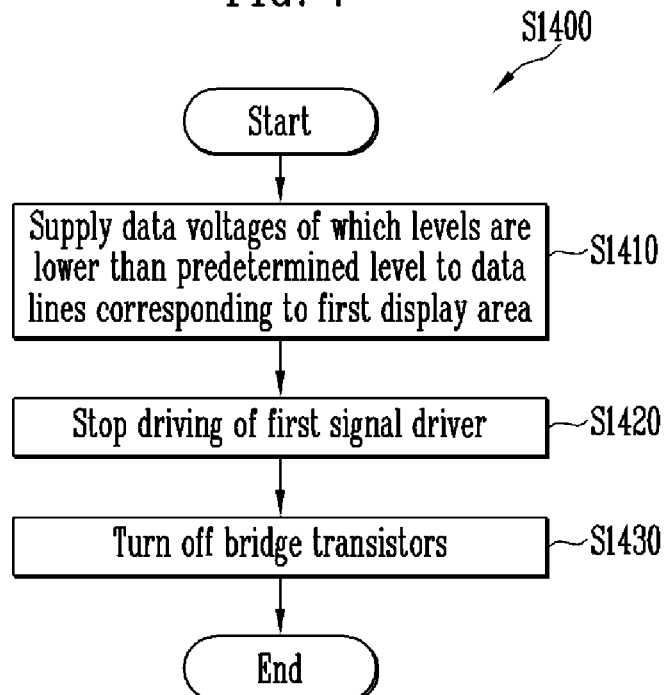


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20130271501 A [0003]
- US 20100091001 A [0003]
- US 20050219169 A [0003]
- US 2012001896 A [0003]
- US 2015170576 A [0003]
- EP 2402932 A [0003]
- CN 104637431 [0003]
- US 20090284500 A [0003]
- US 20040222943 A [0003]

专利名称(译)	像素，包括该像素的有机发光显示装置以及有机发光显示装置的驱动方法		
公开(公告)号	EP3109853B1	公开(公告)日	2019-10-02
申请号	EP2016176470	申请日	2016-06-27
[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DISPLAY CO. , LTD.		
当前申请(专利权)人(译)	三星DISPLAY CO. , LTD.		
[标]发明人	CHO GEUN HO		
发明人	CHO, GEUN HO		
IPC分类号	G09G3/3233 G09G3/3266		
优先权	1020150091342 2015-06-26 KR		
其他公开文献	EP3109853A2 EP3109853A3		
外部链接	Espacenet		

摘要(译)

像素包括有机发光二极管 (OLED) 以及被配置为向有机发光二极管供应电流的驱动电路，该驱动电路包括被配置为控制在有机光中流动的电流的电平的驱动晶体管 (DT)。基于提供给数据线 (Db) 的电压电平的发光二极管，以及第一晶体管 (T1)，其包括电连接到有机发光二极管的阳极的第一电极，第二电极被配置为接收初始化功率 (Vint)，以及电连接到数据线的栅电极，其中第一晶体管被配置为当第一晶体管导通时，将初始化功率提供给有机发光二极管的阳极，使得有机发光二极管不发光。

Equation 1

$$I_{ds} = k(V_{gs} - V_{th})^2$$