(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 785 980 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
02.05.2012 Bulletin 2012/18

(51) Int Cl.:
G09G 3/32 *(2006.01)*

(21) Application number: **06255765.7**

(22) Date of filing: **09.11.2006**

(54) **Pixel and organic light emitting display device using the same**

Pixel und dieses benutzende organische Licht emittierende Anzeigevorrichtung

Pixel et dispositif d'affichage électroluminescent organique l'utilisant

(84) Designated Contracting States:
DE FR GB HU

(30) Priority: **09.11.2005 KR 20050107199**

(43) Date of publication of application:
16.05.2007 Bulletin 2007/20

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- **CHOI S-M ET AL: "AN IMPROVED VOLTAGE PROGRAMMED PIXEL STRUCTURE FOR LARGE SIZE AND HIGH RESOLUTION AM-OLED DISPLAYS" 2004 SID INTERNATIONAL SYMPOSIUM DIGEST OF TECHNICAL PAPERS. SEATTLE, WA, MAY 25 - 27, 2004, SID INTERNATIONAL SYMPOSIUM DIGEST OF TECHNICAL PAPERS, SAN JOSE, CA : SID, US, vol. VOL. 35 PRT 1, 25 May 2004 (2004-05-25), pages 260-263, XP001222795**

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a pixel and an organic light emitting display device using the same, and more particularly, to a pixel for displaying an image with uniform brightness and an organic light emitting display device using the same.

[0002] FIG. 1 is a circuit diagram illustrating a pixel of a conventional organic light emitting display device. The pixel 4 of the conventional organic light emitting display device includes a pixel circuit 2 coupled to an organic light emitting diode (OLED), a data line Dm, and a scan line Sn. The pixel circuit 2 controls the OLED. A first power source ELVDD and a second power source ELVSS are coupled to the pixel 4.

[0003] An anode electrode of the OLED is coupled to the pixel circuit 2 and a cathode electrode of the OLED is coupled to the second power source ELVSS. The OLED generates light with brightness corresponding to the current supplied by the pixel circuit 2.

[0004] The pixel circuit 2 controls the amount of current supplied to the OLED in response to a data signal supplied to the data line Dm when a scan signal is supplied to the scan line Sn. In order to perform this operation, the pixel circuit 2 includes a first transistor M1, a second transistor M2, and a storage capacitor Cst. The second transistor M2 is coupled between the first power source ELVDD and the OLED. The first transistor M1 is coupled to the second transistor M2, the data line Dm, and the scan line Sn. The storage capacitor Cst is coupled between a gate electrode and a first electrode of the second transistor M2.

[0005] A gate electrode of the first transistor M1 is coupled to the scan line Sn and a first electrode of the first transistor M1 is coupled to the data line Dm. A second electrode of the first transistor M1 is coupled to one terminal of the storage capacitor Cst. One of the electrodes of each of the first and second transistors M1, M2 is set as a source electrode and the other electrode is set as a drain electrode. For example, when the first electrode is set as the source electrode, the second electrode is set as the drain electrode. When the scan signal is supplied by the scan line Sn, the first transistor M1 is turned on to supply the data signal supplied by the data line Dm to the storage capacitor Cst. As a result, a voltage corresponding to the data signal is charged in the storage capacitor Cst.

[0006] The gate electrode of the second transistor M2 is coupled to one terminal of the storage capacitor Cst and the first electrode of the second transistor M2 is coupled to the other terminal of the storage capacitor Cst and the first power source ELVDD. The second electrode of the second transistor M2 is coupled to the anode electrode of the OLED. The second transistor M2 controls the amount of current that flows from the first power source ELVDD to the OLED to correspond to the voltage value stored in the storage capacitor Cst. The OLED generates light with the brightness corresponding to the amount of current supplied by the second transistor M2.

[0007] However, according to the above-described conventional pixel 4, it may not be possible to display an image with uniform brightness. To be specific, the threshold voltages of the second transistors M2 included in different pixels 4 vary due to deviations introduced during the fabrication processes. When the threshold voltages of the second transistors M2 are not uniform, although data signals corresponding to the same gray level are supplied to a number of pixels 4, light components with different brightness are generated by the OLEDs of each pixel 4. The difference in brightness is due to the difference between the threshold voltages of the second transistors M2 of each pixel.

[0008] Choi S-M et al: "An improved voltage programmed pixel structure for large size and high resolution AM-OLED displays" 2004 SID International Symposium Digest of Technical Papers. Seattle, WA, May 25 - 27, 2004, SID International Symposium Digest of Technical Papers, San Jose, CA: SID, US, vol. VOL. 35 PRT 1, 25 May 2004 (2004-05-25), pges 260-263, XP001222795 discloses a pixel circuit according to the preamble of Claim 1.

[0009] Other pixel circuits for driving organic light emitting devices are known from EP 1 496 495, EP 1 536 495 and US 2005/0104815.

[0010] Accordingly, embodiments of the present invention provide a pixel for displaying an image with uniform brightness and a light emitting display device using the same.

[0011] According to a first aspect of the invention, there is provided a pixel as set out in claim 1. Preferred features of this aspect are set out in claim 2.

[0012] According to a second aspect of the invention, there is set out an organic light emitting display device as set out in claim 3. Preferred features of this aspect are set out in claims 4 to 9.

[0013] According to a third aspect of the invention, there is provided a method of driving an organic light emitting display as set out in claim 10. Preferred features of this aspect are set out in claims 11 to 15.

[0014] FIG. 1 is a schematic circuit diagram illustrating a conventional pixel.

[0015] FIG. 2 schematically illustrates an organic light emitting display device.

[0016] FIG. 3 is a schematic circuit diagram illustrating a first pixel arrangement not in accordance with the present invention.

[0017] FIG. 4 schematically illustrates waveforms for describing a method of driving the pixel of FIG. 3.

[0018] FIG. 5 schematically illustrates an organic light emitting display device according to an embodiment of the present invention.

[0019] FIG. 6 is a schematic circuit diagram illustrating an embodiment of a pixel according to the present invention.

[0020] FIG. 7 schematically illustrates waveforms for describing a method of driving the pixel of FIG. 6.

[0021] FIG. 2 schematically illustrates an organic light emitting display device.

[0022] The organic light emitting display device includes a scan driving part 110 for driving scan lines S 1 to Sn and emission control lines E1 to En, a data driving part 120 for driving data lines D1 to Dm, a display region 130 including pixels 140 formed in the regions partitioned by the scan lines S1 to Sn and the data lines D1 to Dm, and a timing controller 150 for controlling the scan driving part 110 and the data driving part 120. The timing controller 150 receives data Data and synchronizing signals (not shown) from outside of the display device. The timing controller 150 generates data driving control signals DCS and scan driving control signals SCS corresponding to the synchronizing signals supplied from outside. The data driving control signals DCS generated by the timing controller 150 are supplied to the data driving part 120 and the scan driving control signals SCS generated by the timing controller 150 are supplied to the scan driving part 110. The timing controller 150 supplies the data Data supplied from the outside to the data driving part 120.
The scan driving part 110 receives the scan driving control signals SCS from the timing controller 150. The scan driving part 110 that has received the scan driving control signals SCS, generates scan signals to be supplied to the scan lines S1 to Sn. Also, in response to the scan driving control signals SCS, the scan driving part 110 generates emission control signals to be supplied to the emission control lines E1 to En. The scan signals may be generated in a sequential manner. The width of the emission control signals is equal to or larger than the width of the scan signals.

[0023] The width of a signal may refer to the duration of a pulse of the signal. Some signals may have pulses that correspond to a voltage level below a reference level and other signals may have pulses corresponding to a voltage level above the reference level. For example, some signals may have positive pulses and other signals may have negative pulses. If the signals are being applied to gates of transistors for controlling the transistors, then negative pulses turn on PMOS transistors and positive pulses turn on NMOS transistors. Alternatively, if a signal includes positive pulses, then the positive pulses of the signal may be used to turn off a PMOS transistor.

[0024] The data driving part 120 receives the data driving control signals DCS from the timing controller 150. The data driving part 120 that has received the data driving control signals DCS generates data signals to be supplied to the data lines D1 to Dm in synchronization with the scan signals.

[0025] The display region 130 receives power from a first power source ELVDD and a second power source ELVSS and supplies the power to the pixels 140. The pixels 140 that have received power from the first power source ELVDD and the second power source ELVSS generate light components corresponding to the data signals. The emission times, or duration of emission, of the pixels 140 are controlled by the emission control signals.

[0026] FIG. 3 is a schematic circuit diagram illustrating pixel 140 that may be included in the display device shown FIG. 2. For convenience sake, a pixel 140 coupled to an mth data line Dm, an nth scan line Sn, an (n-1)th scan line Sn-1, and an nth emission control line En is illustrated in FIG. 3.

[0027] The pixel 140 includes a pixel circuit 142 that is coupled to the OLED, and also to the data line Dm, the scan lines Sn-1 and Sn, and the emission control line En to control the amount of current supplied to the OLED.

[0028] An anode electrode of the OLED is coupled to the pixel circuit 142 and a cathode electrode of the OLED is coupled to the second power source ELVSS. The voltage value of the second power source ELVSS is set to be smaller than the voltage value of the first power source ELVDD. The OLED generates light with brightness corresponding to the amount of current supplied by the pixel circuit 142.

[0029] The pixel circuit 142 controls the amount of current supplied to the OLED in response to the data signal supplied to the data line Dm when a scan signal is supplied to the scan line Sn. The pixel circuit 142 includes first to sixth transistors M11, M12, M13, M14, M15, M16 and a storage capacitor C1st.

[0030] A first electrode of the second transistor M12 is coupled to the data line Dm and a second electrode of the second transistor M12 is coupled to a first node N11. A gate electrode of the second transistor M12 is coupled to the nth scan line Sn. When the scan signal is supplied to the nth scan line Sn, the second transistor M12 is turned on to supply the data signal supplied from the data line Dm to the first node N11.

[0031] A first electrode of the first transistor M11 is coupled to the first node N11 and a second electrode of the first transistor M11 is coupled to a first electrode of the sixth transistor M16. A gate electrode of the first transistor M11 is coupled to the storage capacitor C1st. The first transistor M11 supplies the current corresponding to the voltage charged in the storage capacitor C1st to the OLED.

[0032] A first electrode of the third transistor M13 is coupled to the second electrode of the first transistor M11 and a second electrode of the third transistor M13 is coupled to the gate electrode of the first transistor M11. A gate electrode of the third transistors M 13 is coupled to the nth scan line Sn. When the scan signal is supplied to the nth scan line Sn, the third transistor M13 is turned on, the first transistor M11 serves as a diode, and current flow is established through the first transistor M11.
A gate electrode of the fourth transistor M14 is coupled to the (n-1)th scan line Sn-1 and a first electrode of the fourth transistor M14 is coupled to one terminal of the storage capacitor C1st and the gate electrode of the first transistor M11. A second electrode of the fourth transistor M14 is coupled to an initialization power source Vint. When the scan signal is supplied to the (n-1)th scan line Sn-1, the fourth transistor M14 is turned on to change the voltages of the terminal of the storage capacitor C1st

coupled to the fourth transistor M14 and the gate electrode of the first transistor M11 to the voltage of the initialization power source Vint.

A first electrode of the fifth transistor M15 is coupled to the first power source ELVDD and a second electrode of the fifth transistor M15 is coupled to the first node N11. A gate electrode of the fifth transistor M15 is coupled to the emission control line En. When the emission control signal is not being supplied by the emission control line En, the fifth transistor M15 is turned on to electrically connect the first power source ELVDD and the first node N11 to each other.

[0033] The first electrode of the sixth transistor M 16 is coupled to the second electrode of the first transistor M11 and a second electrode of the sixth transistor M16 is coupled to the anode electrode of the OLED. A gate electrode of the sixth transistor M 16 is coupled to the emission control line En. When the emission control signal is not being supplied, the sixth transistor M16 is turned on to supply the current supplied by the first transistor M11 to the OLED.

[0034] The operation of the pixel 140 will be described in detail with reference to waveforms of FIG. 4. FIG. 4 shows the waveforms of the signals applied to the (n-1) th scan line Sn-1, the nth scan line Sn, and the nth emission control line En. First, a scan signal is supplied to the (n-1)th scan line Sn-1 so that the fourth transistor M14 is turned on. When the fourth transistor M14 is turned on, the voltage of the initialization power source Vint is supplied to one terminal of the storage capacitor C1st and the gate terminal of the first transistor M11, that are both coupled to the first electrode of the fourth transistor M14. That is, when the fourth transistor M14 is turned on, the voltages of one terminal of the storage capacitor C1st and the gate terminal of the first transistor M11 are initialized to the voltage of the initialization power source Vint. For the exemplary arrangement shown in FIG. 3, the voltage value of the initialization power source Vint is set to be smaller than the voltage value of the data signal.

[0035] Then, the scan signal is supplied to the nth scan line Sn. When the scan signal is supplied to the nth scan line Sn, the second and third transistors M12, M13 are turned on. When the third transistor M13 is turned on, current flows through the first transistor M11 so that the first transistor M11 serves as a diode. When the second transistor M12 is turned on, the data signal supplied to the data line Dm is supplied to the first node N11 through the second transistor M12. At this time, because the voltage at the gate of the first transistor M11 is initialized to the voltage of the initialization power source Vint and because the voltage of Vint is set to be lower than the voltage of the data signal supplied to the first node N11, the first transistor M11 is turned on.

[0036] When the first transistor M11 is turned on, the data signal applied to the first node N11 is supplied to the terminal of the storage capacitor C1st, that is coupled to the gate of the first transistor M11, through the first and third transistors M11, M13. The data signal is supplied to the storage capacitor C1st through the first transistor M11 which serves as a diode and through which current flows. Therefore, the voltage corresponding to the data signal and a threshold voltage of the first transistor M11 is charged in the storage capacitor C1st.

[0037] After the voltage corresponding to the data signal and the threshold voltage of the first transistor M11 is charged in the storage capacitor C 1 st, supply of the emission control signal is stopped so that the fifth and sixth transistors M15, M16 are turned on. When the fifth and sixth transistors M15, M16 are turned on, a current path from the first power source ELVDD to the OLED is formed. In this case, the first transistor M11 controls the amount of current that flows from the first power source ELVDD to the OLED to correspond to the voltage charged in the storage capacitor C1st.

[0038] As described above, the voltage corresponding to the data signal and the threshold voltage of the first transistor M11 is charged in the storage capacitor C1st included in the pixel 140. The voltages charged in the storage capacitors C1st of different pixels 140 may be different because threshold voltages of the first transistors M11 used in each pixel may be different from one another. However, the threshold voltage is included in the voltage charging the capacitor. As a result, it is possible to control the amount of current that flows to the OLED regardless of the threshold voltage of the first transistor M11. Therefore, various pixels 140 can display an image with substantially uniform brightness regardless of the threshold voltages of the first transistors M11 used in each of the pixels 140.

[0039] However, in the pixel 140 undesired leakage current may originate from the gate terminal of the first transistor M11. To be specific, when the fourth transistor M14 is off, the voltage of the gate electrode of the first transistor M11 is different from the voltage of the initialization power source Vint. As described above, when the voltage of the gate electrode of the first transistor M11 is different from the voltage of the initialization power source Vint, although the fourth transistor M14 is turned off, a leakage current is generated that changes the voltage of the gate electrode of the first transistor M11. That is, in the pixel 140 illustrated in FIG. 3, the voltage of the gate electrode of the first transistor M11 is changed by the leakage current through the fourth transistor M14 so that an image with desired brightness is not displayed.

[0040] FIG. 5 illustrates an organic light emitting display device according to an embodiment of the present invention.

[0041] The organic light emitting display device according to the embodiment of the present invention includes a scan driving part 210, a data driving part 220, a display region 230, and a timing controller 250. The scan driving part 210 drives first scan lines S 11 to S1n, second scan lines S21 to S2n, and emission control lines E1 to En. The data driving part 220 drives data lines D1 to Dm. The display region 230 includes pixels 240 formed in regions partitioned by the first scan lines S 11 to S1n, the second scan lines S21 to S2n, and the data lines D1 to Dm. The timing controller 250 controls the scan driving part 210 and the data driving part 220.

[0042] The timing controller 250 generates data driving control signals DCS and scan driving control signals SCS in response to synchronizing signals supplied from the outside of the display device. The data driving control signals DCS generated by the timing controller 250 are supplied to the data driving part 220 and the scan driving control signals SCS generated by the timing controller 250 are supplied to the scan driving part 210. The timing controller 250 supplies data Data supplied from the outside to the data driving part 220. The scan driving part 210 receives the scan driving control signals SCS from the timing controller 250. The scan driving part 210 that has received the scan driving control signals SCS supplies a first scan signal to the first scan lines S11 to S1n and supplies a second scan signal to the second scan lines S21 to S2n. The first scan signals may be supplied to the first scan lines S11 to S1n in a sequential manner. Similarly, the second scan signals may be supplied to the second scan lines S21 to S2n in a sequential manner. The first and second scan signals supplied to the same pixel 240 are supplied at substantially the same point in time and a width or duration of the first scan signal is set to be larger than a width of the second scan signal. Thus, the first scan signal lasts longer than the second scan signal. The scan driving part 210 generates emission control signals in response to the scan driving control signals SCS and supplies the generated emission control signals to the emission control lines E1 to En. The emission control signals are supplied to overlap the first scan signals. Further, the width or duration of the emission control signal is set to be larger than the width of the first scan signal. The data driving part 220 receives the data driving control signals DCS from the timing controller 250. The data driving part 220, that has received the data driving control signals DCS, generates data signals and supplies the generated data signals to the data lines D 1 to Dm in synchronization with the first and second scan signals.

[0043] The display region 230 receives power from a first power source ELVDD, a second power source ELVSS and an initialization power source Vint located outside the display region 230. The display region 230 supplies the power from the first power source ELVDD, the second power source ELVSS, and the initialization power source Vint to the pixels 240. The pixels 240 that have received power from the first power source ELVDD, the second power source ELVSS, and the initialization power source Vint, generate light components corresponding to the data signals. The emission times, including the time of commencing the emission and the duration of emission, of the pixels 240 are controlled by the emission control signals.

[0044] FIG. 6 is a circuit diagram illustrating an embodiment of a pixel 240 according of the present invention. The embodiment pixel 240 may be included in the display device of the embodiment of the present invention shown in FIG. 5. For convenience sake, a pixel coupled to an mth data line Dm, an nth first scan line S1n, an nth second scan line S2n, and an nth emission control line En is illustrated in FIG. 6.

[0045] The pixel 240 includes a pixel circuit 242 coupled to an OLED, the data line Dm, the first and second scan lines S1n, S2n, and the emission control line En to control the amount of current supplied to the OLED.

[0046] The anode electrode of the OLED is coupled to the pixel circuit 242 and the cathode electrode of the OLED is coupled to the second power source ELVSS. The voltage value of the second power source ELVSS is set to be smaller than the voltage value of the first power source ELVDD. The OLED generates light with brightness corresponding to the amount of current supplied by the pixel circuit 242.

[0047] The pixel circuit 242 receives the data signal from the data line Dm when the scan signals are supplied to the first and second scan lines S1n and S2n. The pixel circuit 242 controls the amount of current supplied to the OLED in response to the data signal. To provide a controlled current to the OLED, the pixel circuit 242 includes first to sixth transistors M21, M22, M23, M24, M25, M26 and a storage capacitor C2st.

[0048] A first electrode of the second transistor M22 is coupled to the data line Dm and a second electrode of the second transistor M22 is coupled to a first node N21. A gate electrode of the second transistor M22 is coupled to the first scan line S1n. The second transistor M22 is turned on when the first scan signal is supplied to the first scan line S1n. When turned on, the second transistor M22 supplies the data signal, that is supplied to the data line Dm, to the first node N21.

[0049] A first electrode of the first transistor M21 is coupled to the first power source ELVDD and a second electrode of the first transistor M21 is coupled to a first electrode of the sixth transistor M26. A gate electrode of the first transistor M21 is coupled to a second node N22. The first transistor M21 supplies the current corresponding to the voltage applied to the second node N22 to the OLED. The current supplied by the first transistor M21 to the OLED corresponds to and is controlled by the voltage at the second node N22. A first electrode of the third transistor M23 is coupled to the second electrode of the first transistor M21 and a second electrode of the third transistor M23 is coupled to the gate electrode of the first transistor M21. A gate electrode of the third transistor M23 is coupled to the first scan line S1n. The third transistor M23 is turned on when the first scan signal is supplied to the first scan line S1n. When the third transistor M23 is turned on, the first transistor M21 serves as a diode. A first electrode of the fourth transistor M24 is coupled to the second electrode of the first transistor M21 and a second electrode of the fourth transistor M24 is coupled to the initialization power source Vint. A gate electrode of the fourth transistor M24 is coupled to the second scan line S2n. The fourth transistor M24 is turned on when the second scan signal is supplied to the second scan line S2n.

[0050] A first electrode of the fifth transistor M25 is coupled to the first node N21 and a second electrode of the fifth transistor M25 is coupled to the initialization power source Vint. A gate electrode of the fifth transistor M25 is coupled to the emission control line En. In the exemplary embodiment shown, the fifth transistor M25 is turned on when the emission control signal is not being supplied by the emission control line En. When turned on, the fifth transistor M25 changes the voltage value of the first node N21 to the voltage value of the initialization power source Vint.

[0051] The first electrode of the sixth transistor M26 is coupled to the second electrode of the first transistor M21 and a second electrode of the sixth transistor M26 is coupled to the anode electrode of the OLED. A gate electrode of the sixth transistor M26 is coupled to the emission control line En. In the exemplary embodiment shown, the sixth transistor M26 is turned on when the emission control signal is not supplied. When turned on, the sixth transistor M26 supplies the current supplied by the first transistor M21 to the OLED.

[0052] The storage capacitor C2st is provided between the first node N21 and the second node N22 to be charged to a voltage established between these two nodes N21, N22.

[0053] The operations of the pixel 240 will be described in detail with reference to the waveforms of FIG. 7. Waveforms of FIG. 7 include a second scan signal being applied to the second scan line S2n, a first scan signal being applied to the first scan line S1n, and an emission control signal being applied to the emission control line En. First, the emission control signal is supplied to the emission control line En during a first period T1. When the emission control signal is being supplied to the emission control line En, the fifth and sixth transistors M25, M26 are turned off.

[0054] In the exemplary embodiments shown, the transistors are shown as PMOS transistors that are turned on by a negative gate to source voltage and turned off by a positive gate to source voltage. Also, in the exemplary embodiment shown, the emission control signal being supplied to the emission control line En is shown to be a positive signal. Accordingly, application of the positive signal to the emission control line turns off the PMOS transistors. In alternative embodiments, other types of transistors, for example NMOS transistors, may be used which are turned on and off by signals different from those shown.

[0055] In the embodiment shown, while the first scan signal is supplied during periods T2 and T3, the second scan signal is supplied only during the period T2. In other words, the first and second scan signals of the embodiment coincide partially in time during the period T2. After the fifth and sixth transistors M25, M26 are turned off, the first scan signal is supplied to the first scan line S1n and, at the same time, the second scan signal is supplied to the second scan line S2n. When the first scan signal is being supplied, the second and third transistors M22, M23 are turned on. When the second scan signal is being supplied, the fourth transistor M24 is turned on. When the second transistor M22 is turned on, the data signal supplied to the data line Dm is supplied to the first node N21. When the third and fourth transistors M23, M24 are turned on together, the voltage of the initialization power source Vint is supplied to the second node N22. In the exemplary embodiment shown, the voltage value of the initialization power source Vint is set to be smaller than the voltage value of the data signal.

[0056] Then, during a third period T3, supply of the second scan signal to the second scan line S2n is stopped. As a result, the fourth transistor M24 is turned off. At this time, because current flows through the third transistor M23 so that the first transistor M21 serves as a diode, the voltage value of the second node N22 is obtained by subtracting the threshold voltage value of the first transistor M21 from the voltage value of the first power source ELVDD. The storage capacitor C2st is charged to the voltage difference between the first node N21 and the second node N22.

[0057] During a fourth period T4, supply of the first scan signal to the first scan line S I n is stopped. Then, the second and third transistors M22, M23 are turned off.

[0058] During a fifth period T5, supply of the emission control signal is stopped. Then, the fifth transistor M25 and the sixth transistor M26 are turned on. When the fifth transistor M25 is turned on, the voltage value of the first node N21 is reduced to the voltage value of the initialization power source Vint. That is, the voltage value of the first node N21 is reduced from the voltage value of the data signal to the voltage value of the initialization power source Vint. In this case, because the third transistor M23 is off and the second node N22 is floating, the voltage value of the second node N22 is reduced corresponding to the reduction in the voltage value of the first node N21 in order to maintain the same voltage difference between the two nodes N22, N21. For example, when the voltage at the first node N21 is reduced by the voltage value of the data signal, then the voltage value of the second node N22 is also reduced by the voltage value of the data signal from its previous voltage value that was obtained by subtracting the threshold voltage value of the first transistor M21 from the voltage value of the first power source ELVDD.

[0059] Then, the first transistor M21 supplies current corresponding to the value of the voltage applied to the second node N22 to the OLED through the sixth transistor M26 during the fifth period T5 so that light of controlled brightness is generated by the OLED. The first to fifth periods, T1, T2, T3, T4, T5 are consecutive in the exemplary embodiment of FIG. 7.

[0060] In the pixel 240, the voltage value of the second node N22 is initially set as the value obtained by subtracting the threshold voltage value of the first transistor

M21 from the voltage value of the first power source ELVDD. The voltage value of the second node N22 is subsequently reduced from the initially set voltage value by the voltage value corresponding to the voltage value of the data signal. The second node N22 is coupled to the gate of the first transistor M21 and the voltage at the second node N22 determines the amount of current supplied to the OLED by the first transistor M21. As a result, in the pixel 240, it is possible to control the amount of current that flows to the OLED regardless of the threshold voltage value of the first transistor M21. Therefore, the pixel 240 can display an image with substantially uniform brightness regardless of the threshold voltage of the first transistor M21.

[0061] In the pixel 240, the fourth transistor M24 that supplies the initialization power source Vint is coupled to the second electrode of the first transistor M21. Therefore, the leakage current through the fourth transistor M24 is from the second electrode of the first transistor M21. As a result, leakage current does not flow from the second node N22 that is the gate electrode of the first transistor M21 to the initialization power source Vint so that it is possible to display an image with desired brightness.

[0062] As described above, in the pixel according to the embodiment of the present invention and the organic light emitting display device using the same, the amount of current that flows to the OLED is controlled regardless of the threshold voltage of the first transistor. Therefore, it is possible to display an image with uniform brightness. According to the preferred embodiment of the present invention, because the fourth transistor for supplying the initialization power source is coupled to the second electrode of the first transistor, it is possible to reduce or prevent leakage current flowing from the gate electrode of the first transistor so that it is possible to display an image with desired brightness.

[0063] Although certain embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes might be made in this embodiment without departing from the scope of the invention, which is defined in the claims.

Claims

1. A pixel (240) comprising:

an organic light emitting diode;
a storage capacitor (C2st) having a first terminal and a second terminal;
a first transistor (M21) comprising a gate electrode, the gate electrode coupled to the second terminal of the storage capacitor (C2st) for supplying a current from a first power source to a second power source through the organic light emitting diode, the current corresponding to and being controlled by a voltage at the second terminal of the storage capacitor (C2st), the first transistor (M21) having a first electrode coupled to the first power source;
a second transistor (M22) coupled between a data line and the first terminal of the storage capacitor (C2st) and arranged to be controlled by a first scan signal supplied to a first scan line; and
a third transistor (M23) coupled between the second terminal of the storage capacitor (C2st) and a second electrode of the first transistor (M21) and arranged to be controlled by the first scan signal; and
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a fourth transistor (M24) coupled between the second electrode of the first transistor (M21) and an initialization power source and arranged to be controlled by a second scan signal supplied to a second scan line; and
a fifth transistor (M25) coupled between the first terminal of the storage capacitor (C2st) and the initialization power source and arranged to be controlled by an emission control signal supplied to an emission control line.

2. A pixel according to claim 1, further comprising a sixth transistor (M26) coupled between the second electrode of the first transistor (M21) and the organic light emitting diode, the sixth transistor (M26) arranged to be controlled by the emission control signal.

3. An organic light emitting display device comprising:

a scan driving part (110) for supplying first scan signals to first scan lines, supplying second scan signals to second scan lines, and supplying emission control signals to emission control lines (El-Em);
a data driving part (120) for supplying data signals to data lines; and
a display region (130) including a pixel according to any one of claims 1 or 2, wherein the pixel is coupled to a first scan line, to a second scan line, and to a data line.

4. An organic light emitting display device according to claim 3, the scan driving part (110) arranged to supply the first scan signal to the first scan line Substantially simultaneously with the supply of the second scan signal to the second scan line, and
the scan driving part (110) further arranged to supply the first scan signal to the first scan line for a duration that is longer than a duration of the supplying of the second scan signal to the second scan line.

5. An organic light emitting display device according to claim 3, the scan driving part (110) arranged to supply the emission control signal to the emission control line for a period that overlaps a period of the supplying of the first scan signal to the first scan line, and Wherein the scan driving part (110) is arranged to supply the emission control signal to the emission control line for a period that is longer than the duration during which the scan driving part (110) supplies the first scan signal to the first scan line.

6. An organic light emitting display device according to any of claims 3 to 5, wherein the scan driving part (110) is arranged to sequentially supply the first scan signals to the first scan lines, to sequentially supply the second scan signals to the second scan lines, and to sequentially supply the emission control signals to the emission control lines.

7. An organic light emitting display device according to claim 3, wherein the scan driving part (110) is arranged to supply the second scan signal during a portion of a period of supplying the first scan signal, wherein the second scan signal turns on the fourth transistor (M24) to supply the initialization voltage through the fourth transistor (M24) to the second terminal of the storage capacitor (C2st) and wherein the first scan signal switches on the second transistor (M22), the scan driving part (110) arranged to supply the second scan signal while the data driving part (120) supplies the data signal, so that the data signal is being supplied through the second transistor (M22) to the first terminal of the storage capacitor (C2st).

8. An organic light emitting display device according to claim 3,
wherein the scan driving part (110) is arranged such that the emission control signal is supplied during periods when at least one of the first scan signal and the second scan signal is being supplied, and
wherein the fifth transistor (M25) and the sixth transistor (M26) are turned off in response to the emission control signal.

9. An organic light emitting display device according to claim 8, wherein the initialization voltage is smaller than a voltage of the data signal.

10. A method for driving an organic light emitting diode in a pixel circuit of an organic light emitting display device, the pixel circuit being a pixel circuit according to Claim 2, the method comprising:

in a first period (T2) applying a data signal to the data line and scan signals to the first and second scan lines, thereby turning ON the second transistor (M22), the third transistor (M23) and the fourth transistor (M24), so that the gate voltage of the first transistor (M21) coupled to the second terminal of the storage capacitor (C2st) is initialized by coupling the gate of the first transistor (M21) to the voltage of the initialization power source through the third transistor (M23) and so that the data voltage is supplied to the first terminal of the storage capacitor (C2st) by turning on the second transistor (M22);
in a subsequent second period (T3) stopping the supply of the second scan signal to the second scan line to turn OFF the fourth transistor (M24), thereby allowing charging of the storage capacitor (C2st) through the first transistor (M21) and the third transistor (M23) to a voltage including a threshold voltage of the first transistor (M21) and to the data voltage through the second transistor (M22);
in a subsequent third period (T4) stopping the supply of the first scan signal to the first scan line to turn off the second transistor (M22) and the third transistor (M23) so that the second terminal of the storage capacitor (C2st) is floating;
in a subsequent fourth period (T5), applying an emission control signal to turn ON the fifth transistor (M25) to supply a voltage of the initialization power source to the first terminal of the storage capacitor (C2st) and to turn ON the sixth transistor (M26) to provide the driving current to the organic light emitting diode through the first transistor (M21), the driving current being controlled by the voltage charged in the storage capacitor (C2st).

11. The method according to claim 10, wherein the charging of the storage capacitor (C2st) to the voltage including the threshold voltage of the first transistor (M21) and the data voltage includes:

charging the storage capacitor (C2st) to a voltage of the first power source minus the data voltage and minus the threshold voltage of the first transistor (M21).

12. A method according to Claim 10 or 11, wherein the charging of the storage capacitor (C2st) to the voltage including the threshold voltage of the first transistor (M21) and the data voltage includes:

supplying a voltage of the first power source to the second terminal of the storage capacitor (C2st) through the first transistor (M21) diode-coupled by the third transistor (M23), thereby reducing the voltage of the first power source as applied to the second terminal of the storage capacitor (C2st) by the threshold voltage of the first transistor (M21);
floating the second terminal of the storage ca-

pacitor (C2st) by turning off the third Transistor (M23); and
reducing the voltage at the first terminal of the storage capacitor (C2st) to the voltage of the initialization power source by turning off the second transistor and coupling the first terminal to the initialization power source.

13. A method according to claim 12, wherein the providing of the driving current to the organic light emitting diode through the first transistor (M21) includes:

turning the sixth transistor (M26) substantially simultaneously ON with the reducing of the voltage at the first terminal of the storage capacitor (C2st) to the voltage of the intialization power source.

14. A method according to any one of claims 10 to 13, wherein the initializing of the gate voltage of the first transistor(M21) coupled to the second terminal of the storage capacitor (C2st) and the supplying of the data voltage to the first terminal of the storage capacitor (C2st) begin substantially simultaneously and are performed during partially overlapping periods, and
wherein the initializing of the gate voltage of the first transistor (M21) and the second terminal of the storage capacitor (C2st) is stopped before the supplying of the data voltage to the first terminal of the storage capacitor (C2st) is stopped.

15. A method according to claim 14, further comprising:

initializing the first terminal of the storage capacitor (C2st) before initializing the gate voltage of the first transistor (M21) and the second terminal of the storage capacitor (C2st),
wherein the providing of the driving current to the organic light emitting diode through the first transistor (M21) is performed after a time delay occurring after the supplying of the data voltage to the first terminal of the storage capacitor (C2st) is stopped.

Patentansprüche

1. Bildpunkt (240), umfassend:

eine organische Leuchtdiode;
einen Speicherkondensator (C2st) mit einem ersten Anschluss und einem zweiten Anschluss;
einen ersten Transistor (M21), der eine Gateelektrode umfasst, wobei die Gateelektrode mit dem zweiten Anschluss des Speicherkondensators (C2st) gekoppelt ist, um einen Strom von einer ersten Stromquelle zu einer zweiten Stromquelle über die organische Leuchtdiode einzuspeisen, wobei der Strom einer Spannung am zweiten Anschluss des Speicherkondensators (C2st) entspricht und durch diese gesteuert wird, wobei der erste Transistor (M21) eine mit der ersten Stromquelle gekoppelte erste Elektrode hat,
einen zweiten Transistor (M22), der zwischen eine Datenleitung und den ersten Anschluss des Speicherkondensators (C2st) gekoppelt ist und dafür eingerichtet ist, durch ein erstes Abtastsignal gesteuert zu werden, das in eine erste Abtastleitung eingespeist wird;
einen dritten Transistor (M23), der zwischen den zweiten Anschluss des Speicherkondensators (C2st) und eine zweite Elektrode des ersten Transistors (M21) gekoppelt ist und dafür eingerichtet ist, durch das erste Abtastsignal gesteuert zu werden; und
gekennzeichnet durch:

einen vierten Transistor (M24), der zwischen die zweite Elektrode des ersten Transistors (M21) und eine Initialisierungsstromquelle gekoppelt ist und dafür eingerichtet ist, **durch** ein zweites Abtastsignal gesteuert zu werden, das in eine zweite Abtastleitung, eingespeist wird; und
einen fünften Transistor (M25), der zwischen den ersten Anschluss des Speicherkondensators (C2st) und die Initialisierungsstromquelle gekoppelt ist und dafür eingerichtet ist, **durch** ein Emissionssteuerungssignal gesteuert zu werden, das in eine Emissionssteuerungsleitung eingespeist wird.

2. Bildpunkt nach Anspruch 1, ferner einen sechsten Transistor (M26) umfassend, der zwischen die zweite Elektrode des ersten Transistors (M21) und die organische Leuchtdiode gekoppelt ist, wobei der sechste Transistor (M26) dafür eingerichtet ist, durch das Emissionssteuerungssignal gesteuert zu werden.

3. Organische Leuchtanzeigevorrichtung, umfassend:

einen Abtastansteuerungsteil (110) zum Einspeisen erster Abtastsignale in erste Abtastleitungen, Einspeisen zweiter Abtastsignale in zweite Abtastleitungen und Einspeisen von Emissionssteuerungssignalen in Emissionssteuerungsleitungen (El-Em);
einen Datenansteuerungsteil (120) zum Einspeisen von Datensignalen in Datenleitungen; und
einen Anzeigebereich (130), der einen Bildpunkt nach einem der Ansprüche 1 oder 2 aufweist,

wobei der Bildpunkt mit einer ersten Abtastleitung, mit einer zweiten Abtastleitung und mit einer Datenleitung gekoppelt ist.

4. Organische Leuchtanzeigevorrichtung nach Anspruch 3, wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, das erste Abtastsignal in die erste Abtastleitung im wesentlichen gleichzeitig mit dem Einspeisen des zweiten Abtastsignals in die zweite Abtastleitung einzuspeisen, und
wobei der Abtastansteuerungsteil (110) ferner dafür eingerichtet ist, das erste Abtastsignal für eine Dauer in die erste Abtastleitung einzuspeisen, die länger als eine Dauer des Einspeisens des zweiten Abtastsignals in die zweite Abtastleitung ist.

5. Organische Leuchtanzeigevorrichtung nach Anspruch 3, wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, das Emissionssteuerungssignal in die Emissionssteuerungsleitung für eine Periode einzuspeisen, die eine Periode des Einspeisens des ersten Abtastsignals in die erste Abtastleitung überlappt, und
wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, das Emissionssteuerungssignal in die Emissionssteuerungsleitung für eine Periode einzuspeisen, die länger als die Dauer ist, während derer der Abtastansteuerungsteil (110) das erste Abtastsignal in die erste Abtastleitung einspeist.

6. Organische Leuchtanzeigevorrichtung nach einem der Ansprüche 3 bis 5, wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, die ersten Abtastsignale nacheinander in die ersten Abtastleitungen einzuspeisen, die zweiten Abtastsignale nacheinander in die zweiten Abtastleitungen einzuspeisen und die Emissionssteuerungssignale nacheinander in die Emissionssteuerungsteitmigen einzuspeisen.

7. Organische Leuchtanzeigevorrichtung nach Anspruch 3, wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, das zweite Abtastsignal während eines Abschnitts einer Periode des Einspeisens des ersten Abtastsignals einzuspeisen, wobei das zweite Abtastsignal den vierten Transistor (M24) einschaltet, um die Initialisierungsspannung über den vierten Transistor (M24) in den zweiten Anschluss des Speicherkondensators (C2st) einzuspeisen, und wobei das erste Abtastsignal den zweiten Transistor (M22) einschaltet, wobei der Abtastansteuerungsteil (110) dafür eingerichtet ist, das zweite Abtastsignal einzuspeisen, während der Datenansteuerungsteil (120) das Datensignal einspeist, so dass das Datensignal über den zweiten Transistor (M22) in den ersten Anschluss des Speicherkondensators (C2st) eingespeist wird.

8. Organische Leuchtanzeigevorrichtung nach Anspruch 3,
wobei der Abtastansteuerungsteil (110) so eingerichtet ist, dass das Emissionssteuerungssignal während Perioden eingespeist wird, wenn mindestens eines des ersten Abtastsignals und des zweiten Abtastsignals eingespeist wird, und
wobei der fünfte Transistor (M25) und der sechste Transistor (M26) als Antwort auf das Emissionssteuerungssignal ausgeschaltet werden.

9. Organische Leuchtanzeigevorrichtung nach Anspruch 8, wobei die Initialisierungsspannung kleiner als eine Spannung des Datensignals ist.

10. Verfahren zum Ansteuern einer organischen Leuchtdiode in einer Bildpunktschaltung einer organischen Leuchtanzeigevorrichtung, wobei die Bildpunktschaltung eine Bildpunktschaltung nach Anspruch 2 ist, wobei das Verfahren umfasst:

in einer ersten Periode (T2) erfolgendes Anlegen eines Datensignals an die Datenleitung und von Abtastsignalen an die ersten und zweiten Abtastleitungen, wodurch der zweite Transistor (M22), der dritte Transistor (M23) und der vierte Transistor (M24) eingeschaltet werden, so dass die Gatespannung des ersten Transistors (M21), der mit dem zweiten Anschluss des Speicherkondensators (C2st) gekoppelt ist, initialisiert wird, indem das Gate des ersten Transistors (M21) über den dritten Transistor (M23) mit der Spannung der Initialisierungsstromquelle gekoppelt wird, und so dass die Datenspannung in den ersten Anschluss des Speicherkondensators (C2st) eingespeist wird, indem der zweite Transistor (M22) eingeschaltet wird;
in einer anschließenden zweiten Periode (T3) erfolgendes Beenden des Einspeisens des zweiten Abtastsignals in die zweite Abtastleitung, um den vierten Transistor (M24) auszuschalten, wodurch ermöglicht wird, dass der Speicherkondensator (C2st) über den ersten Transistor (M21) und den dritten Transistor (M23) auf eine Spannung, die eine Schwellenspannung des ersten Transistors (M21) aufweist, und über den zweiten Transistor (M22) auf die Datenspannung aufgeladen wird;
in einer anschließenden dritten Periode (T4) erfolgendes Beenden des Einspeisen des ersten Abtastsignals in die erste Abtastleitung, um den zweiten Transistor (M22) und den dritten Transistor (M23) auszuschalten, so dass der zweite Anschluss des Speicherkondensators (C2st) floatet;
in einer anschließenden vierten Periode (T5) erfolgendes Anlegen eines Emissionssteuerungssignals, um den fünften Transistor (M25) einzu-

schalten, um eine Spannung der Initialisierungsstromquelle an den ersten Anschluss des Speicherkondensators (C2st) anzulegen und um den sechsten Transistor (M26) einzuschalten, um den Ansteuerstrom über den ersten Transistor (M21) der organischen Leuchtdiode zuzuführen, wobei der Ansteuerstrom durch die im Speicherkondensator (C2st) geladene Spannung, gesteuert wird.

11. Verfahren nach Anspruch 10, wobei das Aufladen des Speicherkondensators (C2st) auf die Spannung, welche die Schwellenspannung des ersten Transistors (M21) aufweist, und auf die Datenspannung aufweist:

Aufladen des Speicherkondensators (C2st) auf eine Spannung der ersten Stromquelle minus die Datenspannung und minus die Schwellenspannung des ersten Transistors (M21).

12. Verfahren nach Anspruch 10 oder 11, wobei das Aufladen des Speicherkondensators (C2st) auf die Spannung, welche die Schwellenspannung des ersten Transistors (M21) aufweist, und auf die Datenspannung aufweist:

Einspeisen einer Spannung der ersten Stromquelle in den zweiten Anschluss des Speicherkondensators (C2st) über den durch den dritten Transistor (M23) diodengekoppelten ersten Transistor (M21), wodurch die Spannung der ersten Stromquelle, wie sie an den zweiten Anschluss des Speicherkondensators (C2st) angelegt wird, um die Schwellenspannung des ersten Transistors (M21) verringert wird;
Floatenlassen des zweiten Anschlusses des Speicherkondensators (C2st) durch Ausschalten des dritten Transistors (M23); und
Verringern der Spannung am ersten Anschluss des Speicherkondensators (C2st) auf die Spannung der Initialisierungsstromquelle durch Ausschalten des zweiten Transistors und Koppeln des ersten Anschlusses mit der Initialisierungsstromquelle.

13. Verfahren nach Anspruch 12, wobei das Übergeben des Ansteuerstroms an die organische Leuchtdiode über den ersten Transistor (M21) aufweist:

Einschalten des sechsten Transistors (M26) im wesentlichen gleichzeitig mit dem Verringern der Spannung am ersten Anschluss des Speicherkondensators (C2st) auf die Spannung der Initialisierungsstromquelle.

14. Verfahren nach einem der Ansprüche 10 bis 13, wobei das Initialisieren der Gatespannung des ersten Transistors (M21), der mit dem zweiten Anschluss des Speicherkondensators (C2st) gekoppelt ist, und das Anlegen der Datenspannung an den ersten Anschluss des Speicherkondensators (C2st) im wesentlichen gleichzeitig beginnen und während teilweise überlappender Perioden durchgeführt werden, und
wobei das Initialisieren der Gatespannung des ersten Transistors (M21) und des zweiten Anschlusses des Speicherkondensators (C2st) beendet wird, bevor das Einspeisen der Datenspannung in den ersten Anschluss des Speicherkondensators (C2st) beendet wird.

15. Verfahren nach Anspruch 14, ferner umfassend:

Initialisieren des ersten Anschlusses des Speicherkondensators (C2st) vor dem Initialisieren der Gatespannung des ersten Transistors (M21) und des zweiten Anschlusses des Speicherkondensators (C2st),
wobei das Übergeben des Ansteuerstroms an die organische Leuchtdiode über den ersten Transistor (M21) nach einer zeitlichen Verzögerung durchgeführt wird, die auftritt, nachdem das Einspeisen der Datenspannung in den ersten Anschluss des Speicherkondensators (C2st) beendet wird.

Revendications

1. Pixel (240) comprenant:

une diode électroluminescente organique ;
un condensateur de stockage (C2st) ayant une première borne et une seconde borne;
un premier transistor (M21) comprenant une électrode de grille, l'électrode de grille étant couplée à la seconde borne du condensateur de stockage (C2st) pour fournir un courant d'une première source d'alimentation à une seconde source d'alimentation par le biais de la diode électroluminescente organique, le courant correspondant à et étant contrôlé par une tension au niveau de la seconde borne du condensateur de stockage (C2st), le premier transistor (M21) ayant une première électrode couplée à la première source d'alimentation;
un deuxième transistor (M22) couplé entre une ligne de données et la première borne du condensateur de stockage (C2st) et conçu pour être contrôlé par un premier signal de balayage fourni à une première ligne de balayage ; et
un troisième transistor (M23) couplé entre la seconde borne du condensateur de stockage (C2st) et une seconde électrode du premier transistor (M21) et conçu pour être contrôlé par le

premier signal de balayage ; et
caractérisé par :

un quatrième transistor (M24) couplé entre la seconde électrode du premier transistor (M21) et une source d'alimentation d'initialisation et conçu pour être contrôlé par un second signal de balayage fourni à une seconde ligne de balayage ; et
un cinquième transistor (M25) couplé entre la première borne du condensateur de stockage (C2st) et la source d'alimentation d'initialisation et conçu pour être contrôlé par un signal de contrôle d'émission fourni à une ligne de contrôle d'émission.

2. Pixel selon la revendication 1, comprenant en outre un sixième transistor (M26) couplé entre la seconde électrode du premier transistor (M21) et la diode électroluminescente organique, le sixième transistor (M26) étant conçu pour être contrôlé par le signal de contrôle d'émission.

3. Dispositif d'affichage électroluminescent organique comprenant :

une partie de commande de balayage (110) destinée à fournir des premiers signaux de balayage aux premières lignes de balayage, à fournir des seconds signaux de balayage aux secondes lignes de balayage, et à fournir des signaux de contrôle d'émission aux lignes de contrôle d'émission (El-Em) ;
une partie de commande de données (120) pour fournir des signaux de données aux lignes de données ; et
une région d'affichage (130) incluant un pixel selon l'une quelconque des revendications 1 ou 2, dans laquelle le pixel est couplé à une première ligne de balayage, à une seconde ligne de balayage et à une ligne de données.

4. Dispositif d'affichage électroluminescent organique selon la revendication 3, la partie de commande de balayage (110) étant conçue pour fournir le premier signal de balayage à la première ligne de balayage sensiblement simultanément à la fourniture du second signal de balayage à la seconde ligne de balayage, et
la partie de commande de balayage (110) étant conçue en outre pour fournir le premier signal de balayage à la première ligne de balayage pendant une durée qui est plus longue qu'une durée de la fourniture du second signal de balayage à la seconde ligne de balayage.

5. Dispositif d'affichage électroluminescent organique selon la revendication 3, la partie de commande de balayage (110) étant conçue pour fournir le signal de contrôle d'émission à la ligne de contrôle d'émission pendant une période qui chevauche une période de la fourniture du premier signal de balayage à la première ligne de balayage, et
dans lequel la partie de commande de balayage (110) est conçue pour fournir le signal de contrôle d'émission à la ligne de contrôle d'émission pendant une période qui est plus longue que la durée au cours de laquelle la partie de commande de balayage (110) fournit le premier signal de balayage à la première ligne de balayage.

6. Dispositif d'affichage électroluminescent organique selon l'une quelconque des revendications 3 à 5, dans lequel la partie de commande de balayage (110) est conçue pour fournir séquentiellement les premiers signaux de balayage aux premières lignes de balayage, pour fournir séquentiellement les seconds signaux de balayage aux secondes lignes de balayage, et pour fournir séquentiellement les signaux de contrôle d'émission aux lignes de contrôle d'émission.

7. Dispositif d'affichage Électroluminescent organique selon la revendication 3, dans lequel la partie de commande de balayage (110) est conçue pour fournir le second signal de balayage pendant une partie d'une période de fourniture du premier signal de balayage, dans lequel le second signal de balayage active le quatrième transistor (M24) pour fournir la tension d'initialisation par le biais du quatrième transistor (M24) à la seconde borne du condensateur de stockage (C2st) et dans lequel le premier signal de balayage active le deuxième transistor (M22), la partie de commande de balayage (110) étant conçue pour fournir le second signal de balayage tandis que la partie de commande de données (120) fournit le signal de données, de telle sorte que le signal de données est fourni par le biais du deuxième transistor (M22) à la première borne du condensateur de stockage (C2st).

8. Dispositif d'affichage électroluminescent organique selon la revendication 3,
dans lequel la partie de commande de balayage (110) est conçue de telle sorte que le signal de contrôle d'émission est fourni au cours de périodes où au moins l'un du premier signal de balayage et du second signal de balayage est fourni, et
dans lequel le cinquième transistor (M25) et le sixième transistor (M26) sont désactivés en réponse au signal de contrôle d'émission,

9. Dispositif d'affichage électroluminescent organique selon la revendication 8, dans lequel la tension d'initialisation est inférieure à une tension du signal de données

10. Procédé d'excitation d'une diode électroluminescente organique dans un circuit de pixel d'un dispositif d'affichage électroluminescent organique, le circuit de pixel étant un circuit de pixel selon la revendication 2, le procédé consistant à :

dans une première période (T2), appliquer un signal de données à la ligne de données et des signaux de balayage aux première et seconde lignes de balayage, activant ainsi le deuxième transistor (M22), le troisième transistor (M23) et le quatrième transistor (M24), de telle sorte que la tension de grille du premier transistor (M21) couplé à la seconde borne du condensateur de stockage (C2st) est initialisée en couplant la grille du premier transistor (M21) à la tension de la source d'alimentation d'initialisation par le biais du troisième transistor (M23) et de telle sorte que la tension de données est fournie à la première borne du condensateur de stockage (C2st) en activant le deuxième transistor (M22) ;
dans une seconde période suivante (T3), arrêter la fourniture du second signal de balayage à la seconde ligne de balayage pour désactiver le quatrième transistor (M24), permettant ainsi le chargement du condensateur de stockage (C2st) par le biais du premier transistor (M21) et du troisième transistor (M23) à une tension comprenant une tension de seuil du premier transistor (M21) et à la tension de données par le biais du deuxième transistor (M22) ;
dans une troisième période suivante (T4), arrêter la fourniture du premier signal de balayage à la première ligne de balayage pour désactiver le deuxième transistor (M22) et le troisième transistor (M23), de telle sorte que la seconde borne du condensateur de stockage (C2st) est flottante ;
dans une quatrième période suivante (T5), appliquer un signal de contrôle d'émission pour activer le cinquième transistor (M25) pour fournir une tension de la source d'alimentation d'initialisation à la première borne du condensateur de stockage (C2st) et activer le sixième transistor (M26) pour fournir le courant d'excitation à la diode électroluminescente organique par le biais du premier transistor (M21), le courant d'excitation étant contrôlé par la tension chargée dans le condensateur de stockage (C2st).

11. Procédé selon la revendication 10, dans lequel le chargement du condensateur de stockage (C2st) à la tension comprenant la tension de seuil du premier transistor (M21) et la tension de données consiste à :

charger le condensateur de stockage (C2st) à une tension de la première source d'alimentation moins la tension de données et moins la tension de seuil du premier transistor (M21).

12. Procédé selon la revendication 10 ou 11, dans lequel le chargement du condensateur de stockage (C2st) à la tension comprenant la tension de seuil du premier transistor (M21) et la tension de données consiste à :

fournir une tension de la première source d'alimentation à la seconde borne du condensateur de stockage (C2st) par le biais du premier transistor (M21) couplé à la diode par le troisième transistor (M23), réduisant ainsi la tension de la première source d'alimentation telle qu'appliquée à la seconde borne du condensateur de stockage (C2st) de la tension de seuil du premier transistor (M21) ;
faire flotter la seconde borne du condensateur de stockage (C2st) en désactivant le troisième transistor (M23) ; et
réduire la tension au niveau de la première borne du condensateur de stockage (C2st) à la tension de la source d'alimentation d'initialisation en désactivant le deuxième transistor et en couplant la première borne à la source d'alimentation d'initialisation.

13. Procédé selon la revendication 12, dans lequel la fourniture du courant d'excitation à la diode électroluminescente organique par le biais du premier transistor (M21) consiste à :

activer le sixième transistor (M26) sensiblement simultanément avec la réduction de la tension au niveau de la première borne du condensateur de stockage (C2st) à la tension de la source d'alimentation d'initialisation.

14. Procédé selon l'une quelconque des revendications 10 à 13,
dans lequel l'initialisation de la tension de grille du premier transistor (M21) couplé à la seconde borne du condensateur de stockage (C2st) et la fourniture de la tension de données à la première borne du condensateur de stockage (C2st) commencent sensiblement simultanément et sont réalisées au cours de périodes se chevauchant partiellement, et
dans lequel l'initialisation de la tension de grille du premier transistor (M21) et de la seconde borne du condensateur de stockage (C2st) est interrompue avant interruption de la fourniture de la tension de données à la première borne du condensateur de stockage (C2st).

15. Procédé selon la revendication 14, consistant en outre à :

initialiser la première borne du condensateur de

stockage (C2st) avant d'initialiser la tension de grille du premier transistor (M21) et la seconde borne du condensateur de stockage (C2st),
dans lequel la fourniture du courant d'excitation à la diode électroluminescente organique par le biais du premier transistor (M21) est réalisée après un délai de temporisation survenant après interruption de la fourniture de la tension de données à la première borne du condensateur de stockage (C2st).

FIG. 1
(PRIOR ART)

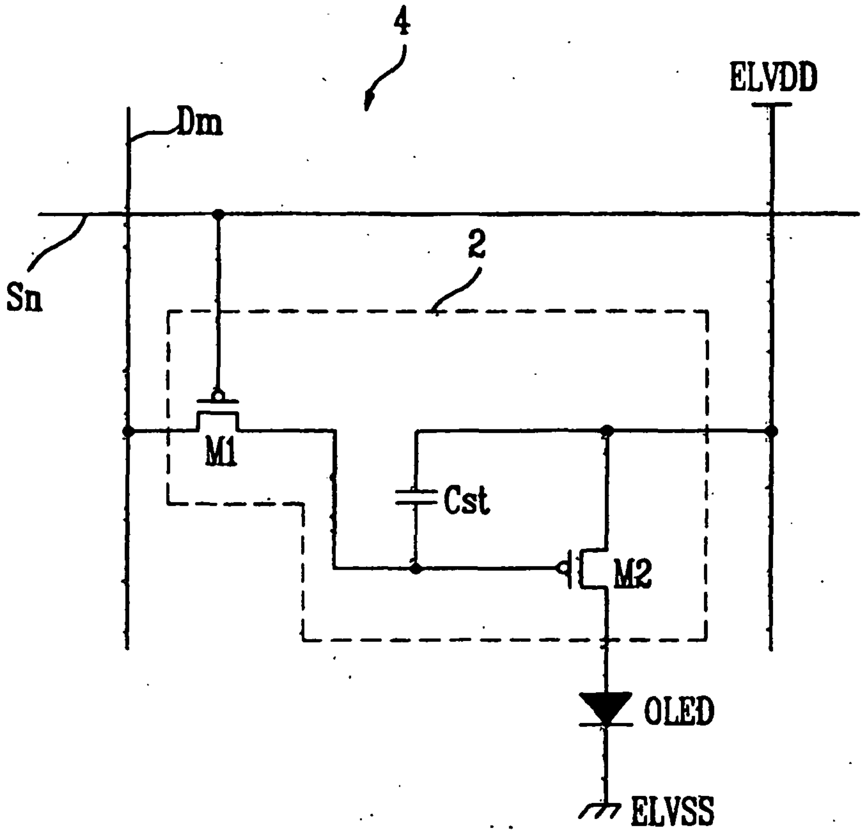


FIG. 2

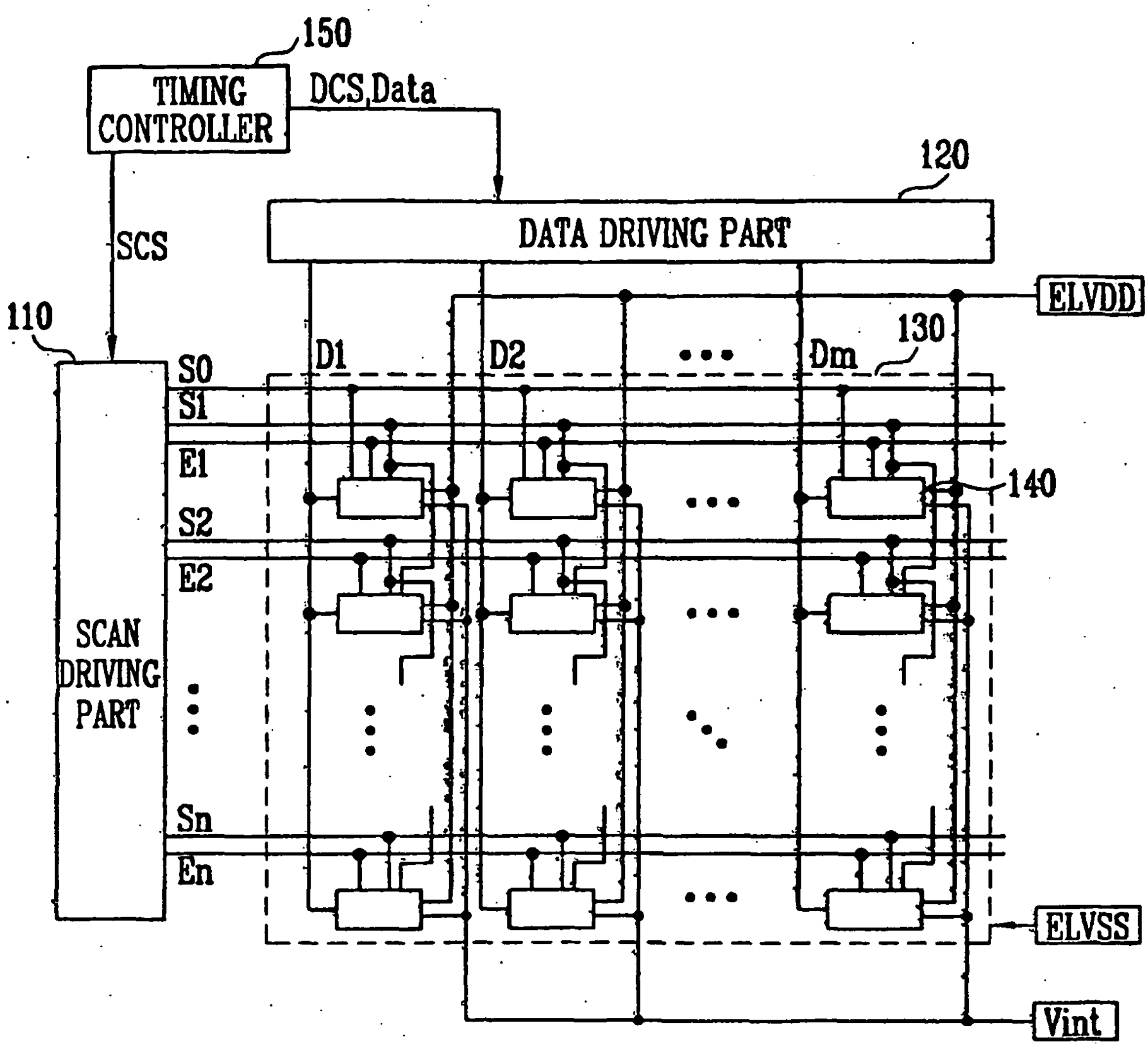

150
TIMING CONTROLLER
DCS,Data
120
DATA DRIVING PART
SCS
ELVDD
110
130
D1
D2
Dm
S0
S1
E1
S2
E2
140
SCAN DRIVING PART
Sn
En
ELVSS
Vint

FIG. 3

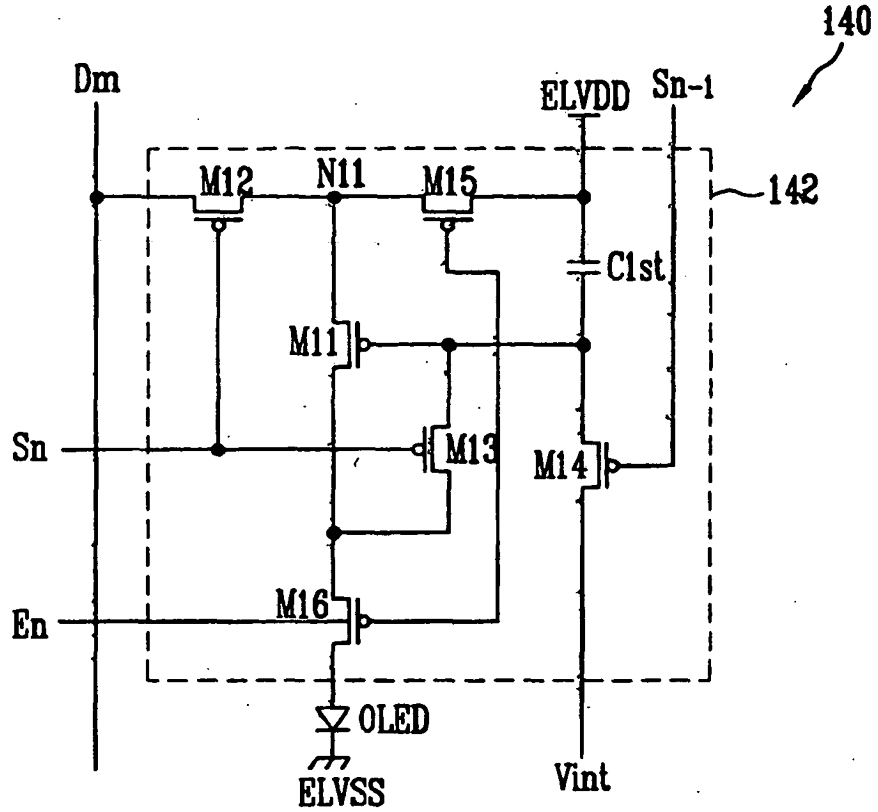

140
Dm
ELVDD
Sn-1
142
M12
N11
M15
C1st
M11
Sn
M13
M14
En
M16
OLED
ELVSS
Vint

FIG. 4

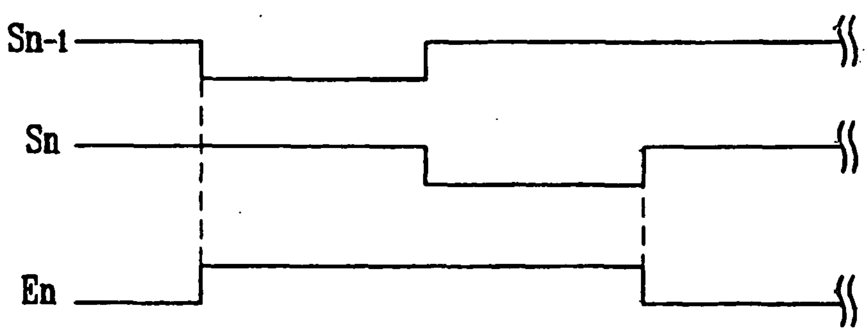

Sn-1
Sn
En

FIG. 5

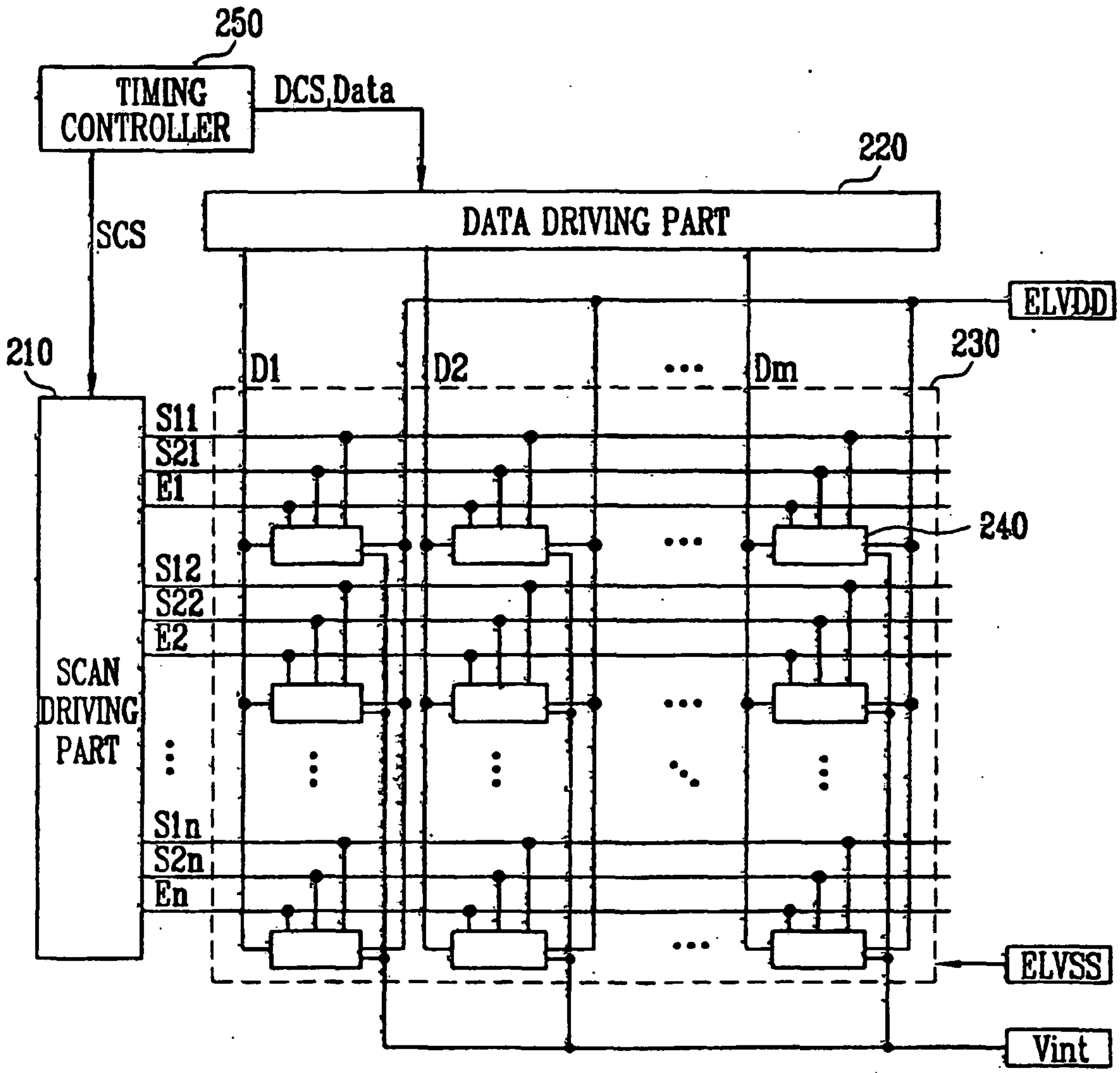

250
TIMING CONTROLLER
DCS,Data
220
DATA DRIVING PART
SCS
ELVDD
210
230
D1
D2
Dm
S11
S21
E1
240
S12
S22
E2
SCAN DRIVING PART
S1n
S2n
En
ELVSS
Vint

FIG. 6

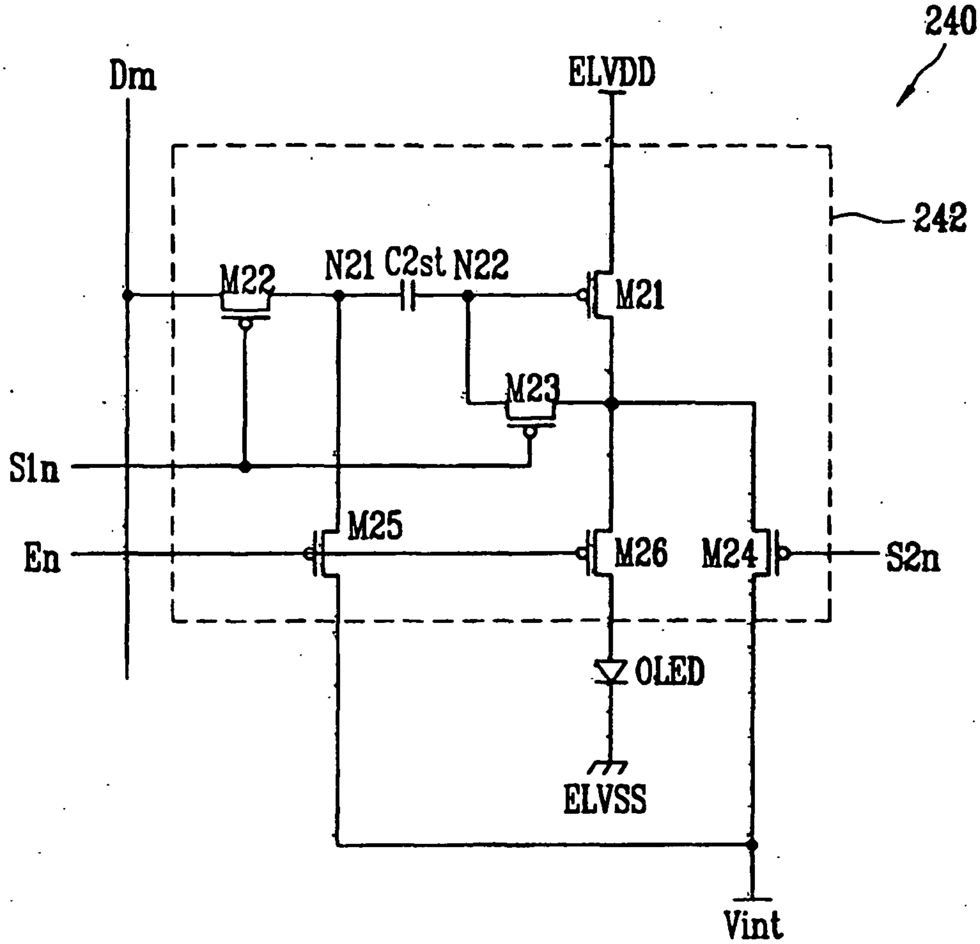
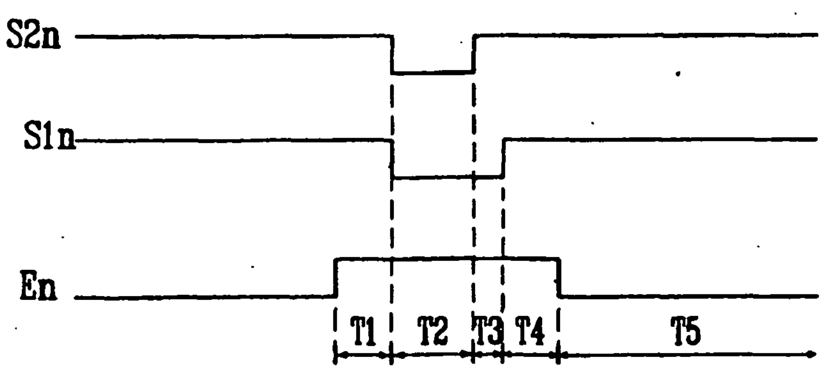

240
Dm
ELVDD
242
M22
N21
C2st
N22
M21
M23
S1n
M25
En
M26
M24
S2n
OLED
ELVSS
Vint

FIG. 7


S2n
S1n
En
T1
T2
T3
T4
T5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1496495 A **[0009]**
- EP 1536495 A **[0009]**
- US 20050104815 A **[0009]**

Non-patent literature cited in the description

- **Choi S-M et al.** An improved voltage programmed pixel structure for large size and high resolution AM-OLED displays. *2004 SID International Symposium Digest of Technical Papers. Seattle, WA, May 25 - 27, 2004, SID International Symposium Digest of Technical Papers, San Jose, CA: SID, US,* 25 May 2004, vol. 35, 260-263 **[0008]**

专利名称(译)	使用其的像素和有机发光显示装置
公开(公告)号	EP1785980B1	公开(公告)日	2012-05-02
申请号	EP2006255765	申请日	2006-11-09
[标]申请(专利权)人(译)	三星斯笛爱股份有限公司
申请(专利权)人(译)	三星SDI CO.，LTD.
当前申请(专利权)人(译)	三星移动显示器有限公司.
发明人	KIM, YANG WAN C/O SAMSUNG SDI CO., LTD.
IPC分类号	G09G3/32
CPC分类号	G09G3/3233 G09G2300/0819 G09G2300/0842 G09G2300/0861 G09G2300/0866 G09G2320/0233 G09G2320/043
优先权	1020050107199 2005-11-09 KR
其他公开文献	EP1785980A2 EP1785980A3
外部链接	Espacenet

摘要(译)

提供了用于显示具有均匀亮度的图像的像素。像素包括由像素电路驱动的有机发光二极管（OLED）。像素电路耦合到数据线，两条扫描线和显示装置的发射控制线。像素由外部电源和初始化电压源提供电力。像素电路包括晶体管和存储电容器，其维持驱动晶体管的栅极处的电压，掩蔽在各种像素中使用的驱动晶体管的阈值电压之间的任何变化。替代实施例，修改从驱动晶体管的栅极到初始化电压源的泄漏路径。泄漏的实质影响从驱动晶体管的栅极转移到漏极。结果，在每个像素中保持基本均匀的亮度。

FIG. 1
(PRIOR ART)