traditional current-driven active matrix organic light emitting diode (AMOLED) display.

[0013] It is another object of the present invention to maintain a brightness of the organic light emitting diode (OLED) in the pixel driving unit of the traditional voltage-driven AMOLED display.

[0014] An AMOLED display with a plurality of pixel driving units of voltage-driven design but applied with a driving current is provided in the present invention. The pixel driving unit having at least a displaying OLED and a driving transistor is connected to a reference unit in parallel. The reference unit has a reference OLED and a reference transistor corresponding to the displaying OLED and the driving transistor in the pixel driving unit respectively for defining a specific relationship between the values of the driving current passing through the pixel driving unit and a reference current passing through the reference unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The present invention will now be specified with reference to its preferred embodiment illustrated in the drawings, in which:

[0016] **FIG. 1** shows an equivalent circuit diagram of a pixel driving unit in a traditional voltage-driven AMOLED display;

[0017] **FIG. 2** shows an equivalent circuit diagram of a pixel driving unit in a traditional current-driven AMOLED display;

[0018] **FIG. 3** shows a block diagram depicting a preferred embodiment of the driving circuit of an AMOLED display in accordance with the present invention; and

[0019] **FIG. 4** shows an equivalent circuit diagram depicting the pixel driving unit connected to the reference unit in parallel through the data line shown in **FIG. 3**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] **FIG. 3** shows a block diagram depicting a preferred embodiment of the driving circuit **100** of an active matrix organic light emitting diode (AMOLED) display in accordance with the present invention. The driving circuit **100** includes a data driver **120**, a scan driver **140**, a power supplier **150**, a plurality of pixel driving units **160**, and a plurality of reference units **180**. The pixel driving units **160** are arranged on the display in matrix. The data driver **120** is connected to the pixel driving units **160** and the reference units **180** through a plurality of data lines **122**. The scan driver **140** is connected to the pixel driving units **160** through a plurality of scan lines **142**. The power supplier **150** is utilized to apply power to the organic light emitting diodes (not shown in this figure) of each pixel driving unit **160**. As shown, each row of the pixel driving units **160** is coupled to a corresponded reference unit **180** through the data line **122**. The reference unit **180** is arrange at the lower edge of the row of pixel driving units **160** and shielded to prevent some unwanted influence for normal displaying. By contrast with the traditional current-driven pixel driving unit of **FIG. 2**, the reference unit **180** is utilized to play a role as one of the mirror circuits and the required elements of the pixel driving unit **160** in the present invention can be reduced.

[0021] **FIG. 4** shows an equivalent circuit diagram depicting the pixel driving unit **160** connected to the reference unit **180** in parallel through the data line **122** shown in **FIG. 3**. As shown, the pixel driving unit **160** includes a switch transistor **T1**, a driving transistor **T2**, a capacitor C, and a displaying organic light emitting diode (OLED). The switch transistor **T1** has a source electrode connected to the respected data line **122** and a gate electrode connected to the respected scan line **142**. The driving transistor **T2** has a gate electrode connected to a drain electrode of the switch transistor **T1**, and has a drain electrode connected to a power supplier (not shown in this figure) through a power line **152** for receiving a first potential Vdd. The capacitor C has a first end connected to the drain electrode of the driving transistor **T2** and a second end opposing to the first end connected to both the source electrode of the switch transistor **T1** and the gate electrode of the driving transistor **T2**. The displaying OLED has an anode connected to the source electrode of the driving transistor **T2** and a cathode provided with a second potential Vss, which may be corresponding to a grounded potential.

[0022] The reference unit **180** includes a reference transistor Tm corresponding to the driving transistor **T2** of the pixel driving unit **160** and a reference organic light emitting diode OLEDm corresponding to the displaying organic light emitting diode OLED of the pixel driving unit **160**. The reference transistor Tm has a gate electrode and a drain electrode both connected to the respected data line **122**. In addition, the reference organic light emitting diode OLEDm has an anode connected to a source electrode of the reference transistor Tm and a cathode provided with the second potential Vss.

[0023] It is noted that the value of the current passing through the reference transistor Tm determines the difference between the gate to source voltage Vgs' and the threshold voltage Vt' of the reference transistor Tm. In addition, the voltage level of the data line Vdata equals to the sum of the gate to source voltage Vgs', the anode to cathode voltage Voled' of the reference organic light emitting diode OLEDm, and the second potential Vss (Vdata=Vgs'+Voled'+Vss). Therefore, a preset driving current signal I determines the voltage level Vdata on the data line.

[0024] As a scanning voltage applied through the scan line **142** to the pixel driving unit **160** is at a high level state to switch on the switch transistor **T1**, a voltage difference between the first potential Vdd and the voltage level on the data line **122** Vdata is applied and stored in the capacitor C. In this situation, the gate to source voltage Vgs of the driving transistor **T2** equals to Vdata−Voled−Vss, wherein Voled is the anode to cathode voltage of the displaying OLED.

[0025] Since the voltage level on the data line **142** Vdata equals to Vgs'+Voled'+Vss, and the gate to source voltage Vgs of the driving transistor **T2** equals to Vdata−Voled−Vss, it is calculated that the gate to source voltage Vgs of the driving transistor **T2** equals to Vgs'−(Voled−Voled'). In addition, the difference between the voltage Vgs and the threshold voltage Vt of the driving transistor **T2** determines the value of the current I' passing through the displaying OLED for illumination.

[0026] As mentioned above, the driving circuit in accordance with the present invention has the following advantages.