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Park**

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(54) **ORGANIC LIGHT EMITTING DISPLAY
DEVICE WITH AN INPUT VOLTAGE
CONTROLLED IN ACCORDANCE WITH AN
OFFSET CONTROL SIGNAL**

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G09G 3/30 (2006.01)

(52) **U.S. Cl.**

USPC **345/76; 345/211**

(58) **Field of Classification Search**

USPC 345/52, 76, 77, 204, 211, 212, 214;
315/169.2, 169.3

See application file for complete search history.

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(57) **ABSTRACT**

An organic light emitting display device capable of maintaining a voltage of a driving power of a display panel in a substantially constant manner. The organic light emitting display device includes a display panel for receiving an image data and an input voltage to display an image; a driving IC for supplying the image data to the display panel, receiving the input voltage, and outputting an offset control signal in accordance with the received input voltage; and a power supply for controlling the input voltage in accordance with the offset control signal, and supplying the controlled input voltage to the display panel.

9 Claims, 2 Drawing Sheets

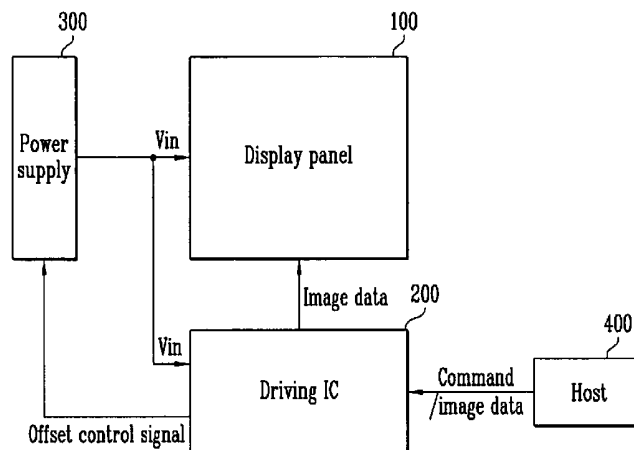


FIG. 1

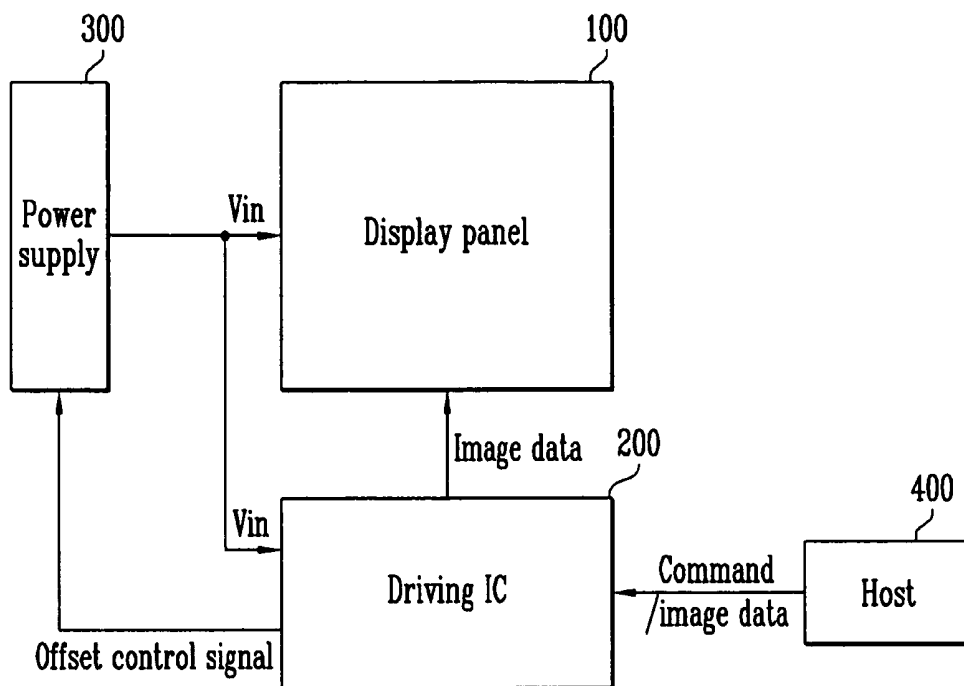


FIG. 2

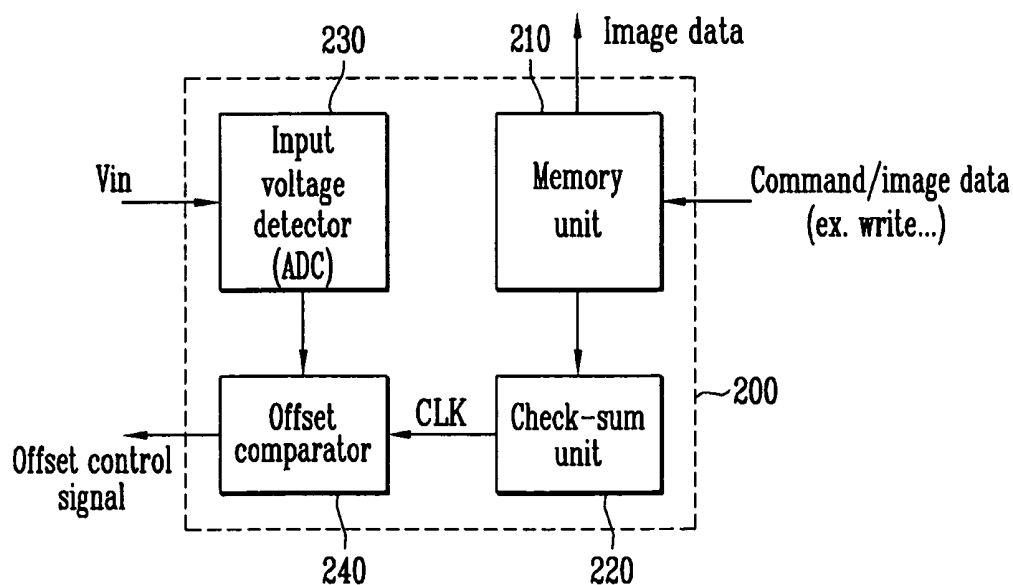
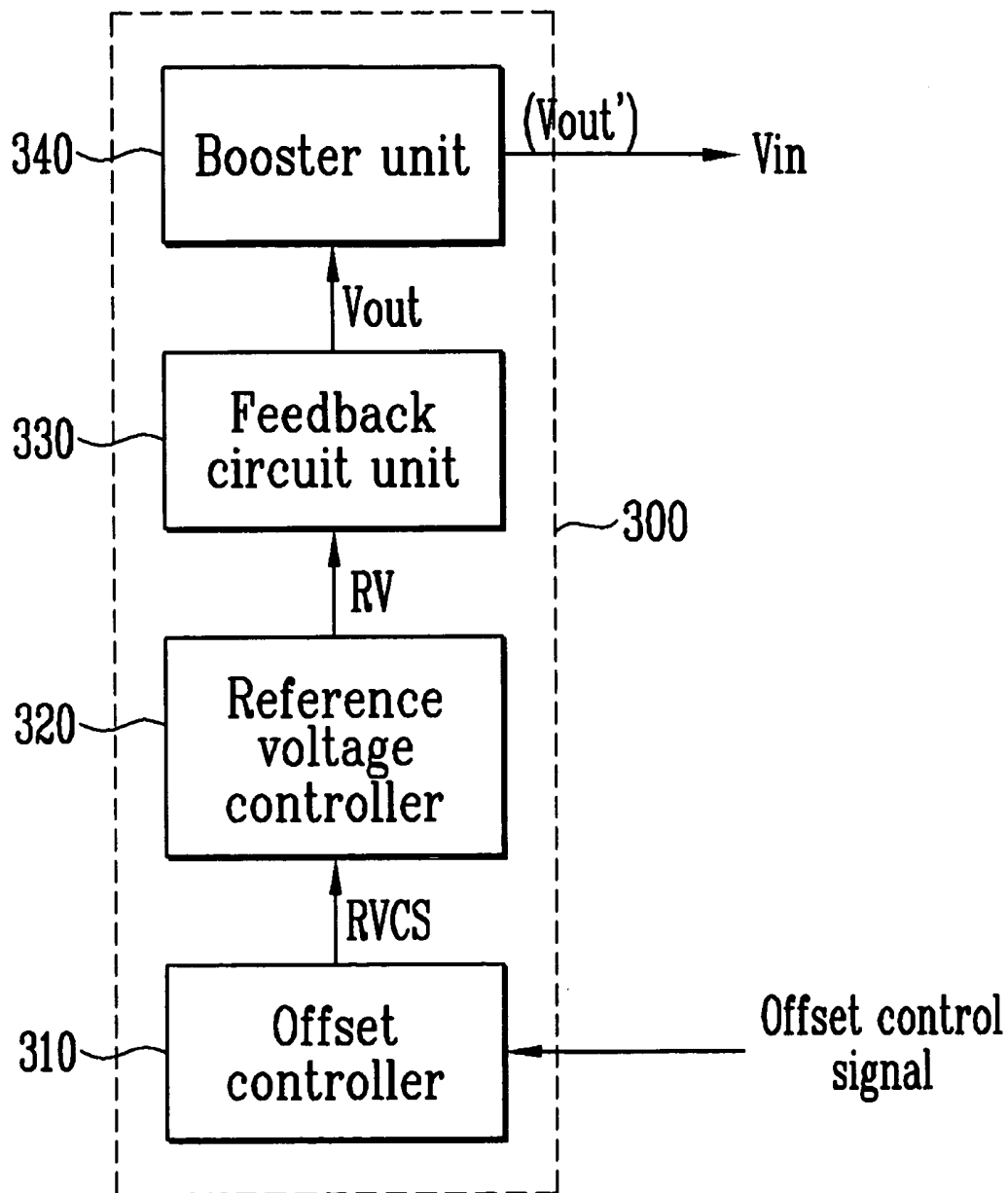


FIG. 3



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ORGANIC LIGHT EMITTING DISPLAY DEVICE WITH AN INPUT VOLTAGE CONTROLLED IN ACCORDANCE WITH AN OFFSET CONTROL SIGNAL

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to and the benefit of Korean Patent Application No. 10-2008-0056253, filed on Jun. 16, 2008, in the Korean Intellectual Property Office, the entire content of which is incorporated herein by reference.

BACKGROUND

1. Field of the Invention

The present invention relates to an organic light emitting display device, and, more particularly, to an organic light emitting display device capable of maintaining a voltage of a driving power of a display panel in a substantially constant manner.

2. Discussion of Related Art

Recently, studies have been made to develop organic light emitting display devices which can be thin and light, can have fast response speed, and can be driven with low power consumption.

An organic light emitting display device is a flat panel display device that displays images using an organic light emitting diode for generating light through the recombination of electrons and holes.

Such an organic light emitting display device includes a display panel for displaying images, a power supply for supplying driving power to the display panel, and a driving integrated circuit (IC) for supplying driving signals to the display panel.

However, in the organic light emitting display device, the luminance of an image may be changed depending on the voltage of the driving power. That is, the voltage distribution of the driving power supplied to the display panel of the organic light emitting display device is linked to the luminance distribution of the image displayed in the display panel.

Therefore, in order to display a proper image, the voltage of the driving power provided to the display panel should be maintained in a substantially constant manner.

SUMMARY OF THE INVENTION

An aspect of an embodiment of the present invention is directed toward an organic light emitting display device capable of maintaining a voltage of a driving power of a display panel in a substantially constant manner.

According to an embodiment of the present invention, an organic light emitting display device includes: a display panel (e.g., an organic light emitting display panel) for receiving an image data and an input voltage to display an image; a driving integrated circuit (IC) for supplying the image data to the display panel, receiving the input voltage, and outputting an offset control signal in accordance with the received input voltage; and a power supply for controlling the input voltage in accordance with the offset control signal, and supplying the controlled input voltage to the display panel.

Here, the driving IC may include an input voltage detector for detecting the input voltage; and an offset comparator for comparing the voltage value of the input voltage with a set voltage value, and outputting the offset control signal to the power supply in accordance with the compared result. The driving IC may further include a check-sum unit for output-

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ting a clock signal for controlling the offset comparator in accordance with a write command from a host.

Further, the power supply may include an offset controller for detecting the offset control signal to output a reference voltage control signal; a reference voltage controller for controlling a reference voltage in accordance with the reference voltage control signal; a feedback circuit unit for controlling an output voltage of the power supply in accordance with the reference voltage; and a booster unit for boosting the output voltage to output the boosted output voltage as the input voltage of the display panel.

As described above, according to embodiments of the present invention, a reference voltage is controlled by detecting a voltage (i.e., an input voltage) of a driving power inputted to an input terminal of a display panel, so that the input voltage can be maintained in a substantially constant manner. Accordingly, luminance variations of an image can be minimized or reduced to display a proper image.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. 1 is a schematic block diagram of an organic light emitting display device according to an embodiment of the present invention.

FIG. 2 is a schematic block diagram showing an embodiment of a driving IC shown in FIG. 1.

FIG. 3 is a schematic block diagram showing an embodiment of a power supply shown in FIG. 1.

DETAILED DESCRIPTION

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

FIG. 1 is a schematic block diagram of an organic light emitting display device according to an embodiment of the present invention.

Referring to FIG. 1, the organic light emitting display device includes a display panel (e.g., an organic light emitting display panel) **100**, a driving integrated circuit (IC) **200** and a power supply **300**.

The display panel **100** displays an image in accordance with both an image data supplied from the driving IC **200**, and a voltage (hereinafter, referred to as an "input voltage V_{in} ") of a driving power supplied from the power supply **300**. In addition, the display panel **100** includes a plurality of pixels, each of the pixels having at least one organic light emitting diode.

The driving IC **200** supplies an image data and/or various suitable driving signals in accordance with a command and/or an image data supplied from a host **400**. For example, if a scan driver and/or a data driver are mounted in the display panel **100**, the driving IC **200** supplies driving signals to drive the scan driver and/or the data driver and supplies the image data supplied from the host **400** to the display panel **100**.

Meanwhile, in an embodiment of the present invention, the driving IC **200** receives an input voltage V_{in} that is also inputted to an input terminal of the display panel **100**, generates an offset control signal in accordance with the input voltage, and outputs the generated offset control signal to the power supply **300**.

The power supply **300** supplies a driving power to drive the display panel **100**. However, in an embodiment of the present invention, the power supply **300** controls an output voltage of the driving power in accordance with the offset control signal supplied from the driving IC **200**, so that the input voltage V_{in} supplied to the display panel **100** is maintained at a set value.

Here, the voltage outputted from the power supply **300** is the input voltage V_{in} inputted to the display panel **100**. Therefore, the voltage outputted from the power supply **300** should ideally be equal to the input voltage V_{in} . However, the voltage outputted from the power supply **300** is usually different from the input voltage V_{in} due to a load of the transmission wires. As such, the luminance of the display panel **100** can change depending on the input voltage V_{in} (i.e., an input voltage such as ELVDD). Therefore, in the embodiment of the present invention, the power supply **300** is controlled based on the input voltage V_{in} .

As described above, in the embodiment of the present invention, the input voltage V_{in} is maintained in a substantially constant manner by utilizing a feedback for detecting the input voltage V_{in} inputted to the input terminal of the display panel **100** and controlling a voltage outputted from an output terminal of the power supply **300** according to the input voltage V_{in} .

Accordingly, a proper (or optimal) image can be displayed by minimizing or reducing luminance variations of an image due to the input voltage V_{in} regardless of a characteristic distribution of the power supply **300** and/or a load of the display panel **100**.

In view of the foregoing, an organic light emitting display device has been described as an example of the present invention. However, the present invention is not limited thereto. That is, the technical scope of the present invention may be applied to various other types of suitable flat panel display devices.

FIG. **2** is a schematic block diagram showing an embodiment of the driving IC shown in FIG. **1**.

Referring to FIG. **2**, the driving IC **200** includes a memory unit **210**, a check-sum unit **220**, an input voltage detector **230** and an offset comparator **240**.

The memory unit **210** includes a memory and/or a register for storing a command and/or an image data inputted from an external device, such as the host **400**. Here, the image data inputted to the memory unit **210** is check-summed in the check-sum unit **220** to test whether or not an error has occurred, and then the check-summed image data is supplied to the display panel **100**.

The check-sum unit **220** tests whether or not an error of the image data stored in the memory unit **210** has occurred, and also outputs a clock signal CLK for controlling the offset comparator **240** in accordance with the command inputted from the host **400**. For example, the check-sum unit **220** may recognize a write command inputted from the host **400** by referring to the memory unit **210** and may output a clock signal CLK to be synchronized with the write command.

The input voltage detector **230** detects the amplitude of an input voltage V_{in} inputted through the input terminal of the display panel **100**. Here, the input voltage detector **230** may include an analog-to-digital converter (ADC) for receiving the input voltage V_{in} and for converting the input voltage V_{in} into a digital signal.

The offset comparator **240** compares the voltage value of the input voltage V_{in} detected by the input voltage detector **230** with a previously set and stored voltage value (comparison value), and outputs an offset control signal in accordance with the compared result. Here, the previously stored voltage value is set to be an ideal voltage value that should be inputted to the display panel **100** so as to display a proper (or optimal) image.

More specifically, the offset comparator **240** detects an offset value in accordance with a difference between the voltage value of the input voltage V_{in} and the previously stored voltage value, and outputs the offset value to the power supply **300** through an offset control signal.

As an example, assume that the voltage value of the input voltage V_{in} and the previously stored voltage value are 4.62V and 4.6V, respectively, and the resolution of the ADC is 10 mV. In this case, the offset comparator **240** may detect a value "2" obtained by dividing 20 mV that is the difference between 4.62V and 4.60V by 10 mV that is the resolution of the ADC.

Such an offset value is provided to the power supply **300** through an offset control signal to control a reference voltage of the power supply **300**. Here, the offset control signal may be an offset value itself or a conversion signal converted to correspond to the offset value.

In addition, the operation of the offset comparator **240** is controlled by a clock signal CLK supplied from the check-sum unit **220**.

For example, the offset comparator **240** maintains a previous data until a clock signal CLK is supplied from the check-sum unit **220** in accordance with a write command inputted from the host **400**, and outputs an offset control signal when the clock signal CLK is supplied, thereby controlling the power supply **300**.

As described above, the driving IC **200** outputs an offset control signal in accordance with an input voltage V_{in} to control the power supply **300**. Accordingly, the driving IC **200** controls the power supply **300** to supply a substantially constant input voltage V_{in} to the display panel **100**.

FIG. **3** is a schematic block diagram showing an embodiment of the power supply shown in FIG. **1**.

Referring to FIG. **3**, the power supply **300** includes an offset controller **310**, a reference voltage controller **320**, a feedback circuit unit **330** and a booster unit **340**.

The offset controller **310** detects an offset control signal supplied from the driving IC **200** and outputs a reference voltage control signal RVCS in accordance with the offset control signal. Here, the reference voltage control signal RVCS may be an offset control signal itself or a conversion signal converted to correspond to the offset control signal.

The reference voltage controller **320** controls a reference voltage RV of the feedback circuit unit **330** to correspond to the reference voltage control signal RVCS outputted from the offset controller **310**.

The feedback circuit unit **330** outputs an output voltage V_{out} of the power supply **300** to correspond to the reference voltage RV controlled by the reference voltage controller **320**.

The booster unit **340** boosts the output voltage V_{out} outputted from the feedback circuit unit **330** and outputs the boosted output voltage V_{out}' to the output terminal of the power supply **300**.

The boosted output voltage V_{out}' is inputted as an input voltage V_{in} through the input terminal of the display panel **100**. The input voltage V_{in} is also inputted to the driving IC **200** to be used in generating an offset control signal.

As described above, the power supply **300** receives an offset control signal generated from the driving IC **200** to correspond to an input voltage V_{in} and controls an output

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voltage V_{out} accordingly. Consequently, the power supply 300 controls an output voltage V_{out} in a feedback manner, so that an input voltage V_{in} inputted to the display panel 100 is maintained in a substantially constant manner.

Particularly, in an embodiment of the present invention, an output voltage V_{out} of the power supply 300 is controlled to correspond to an input voltage measured at the input terminal of the display panel 100, in consideration of a voltage drop between the power supply 300 and the display panel 100. Accordingly, a luminance variation of an image due to a variation of an input voltage can be minimized or reduced to display a proper (or optimal) image.

While the present invention has been described in connection with certain exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, and equivalents thereof.

What is claimed is:

1. An organic light emitting display device, comprising:
 - a display panel for receiving an image data and an input voltage and displaying an image in accordance with the image data and the input voltage;
 - a driving integrated circuit (IC) for supplying the image data to the display panel, receiving the input voltage, and outputting an offset control signal in accordance with the received input voltage; and
 - a power supply for controlling the input voltage in accordance with the offset control signal, and supplying the controlled input voltage to the display panel, wherein the driving IC comprises:
 - an input voltage detector for detecting the input voltage;
 - an offset comparator for comparing a voltage value of the input voltage with a set voltage value to provide a compared result, and outputting the offset control signal to the power supply in accordance with the compared result; and
 - a check-sum unit for outputting a clock signal for controlling the offset comparator in accordance with a write command from a host.
2. The organic light emitting display device as claimed in claim 1, wherein the input voltage detector comprises an analog-to-digital converter (ADC) for converting the input voltage into a digital signal.
3. The organic light emitting display device as claimed in claim 1, wherein the offset comparator outputs a difference between the voltage value of the input voltage and the set voltage value to the power supply through the offset control signal.
4. The organic light emitting display device as claimed in claim 1, wherein the power supply comprises:
 - an offset controller for detecting the offset control signal and outputting a reference voltage control signal in accordance with the offset control signal;

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a reference voltage controller for controlling a reference voltage in accordance with the reference voltage control signal;

a feedback circuit unit for controlling an output voltage of the power supply in accordance with the reference voltage; and

a booster unit for boosting the output voltage and outputting a boosted output voltage as the input voltage of the display panel.

5. A display device, comprising:

a light emitting display panel for receiving an image data and an input voltage and displaying an image in accordance with the image data and the input voltage;

a driving integrated circuit (IC) for supplying the image data to the light emitting display panel, receiving the input voltage, and outputting an offset control signal in accordance with the received input voltage;

a power supply for controlling the input voltage in accordance with the offset control signal, and supplying the controlled input voltage to the light emitting display panel,

wherein the driving IC comprises:

- an input voltage detector for detecting the input voltage;
- an offset comparator for comparing a voltage value of the input voltage with a set voltage value to provide a compared result, and outputting the offset control signal to the power supply in accordance with the compared result; and

- a check-sum unit for outputting a clock signal for controlling the offset comparator in accordance with a write command from a host.

6. The display device as claimed in claim 5, wherein the input voltage detector comprises an analog-to-digital converter (ADC) for converting the input voltage into a digital signal.

7. The display device as claimed in claim 5, wherein the offset comparator outputs a difference between the voltage value of the input voltage and the set voltage value to the power supply through the offset control signal.

8. The display device as claimed in claim 5, wherein the power supply comprises:

- an offset controller for detecting the offset control signal and outputting a reference voltage control signal in accordance with the offset control signal;

- a reference voltage controller for controlling a reference voltage in accordance with the reference voltage control signal;

- a feedback circuit unit for controlling an output voltage of the power supply in accordance with the reference voltage; and

- a booster unit for boosting the output voltage and outputting a boosted output voltage as the input voltage of the display panel.

9. The display device as claimed in claim 5, wherein the light emitting display panel is an organic light emitting display panel.

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专利名称(译)	具有根据偏移控制信号控制的输入电压的有机发光显示装置		
公开(公告)号	US8717256	公开(公告)日	2014-05-06
申请号	US12/467144	申请日	2009-05-15
[标]申请(专利权)人(译)	朴成联合国		
申请(专利权)人(译)	朴成-UN		
当前申请(专利权)人(译)	三星DISPLAY CO. , LTD.		
[标]发明人	PARK SUNG UN		
发明人	PARK, SUNG-UN		
IPC分类号	G09G3/30		
CPC分类号	G09G3/3208 G09G2330/021 G09G2320/0223		
优先权	1020080056253 2008-06-16 KR		
其他公开文献	US20090309817A1		
外部链接	Espacenet USPTO		

摘要(译)

一种有机发光显示装置，能够以基本恒定的方式维持显示面板的驱动功率的电压。有机发光显示装置包括用于接收图像数据和输入电压以显示图像的显示面板；驱动IC，用于将图像数据提供给显示面板，接收输入电压，并根据接收的输入电压输出偏移控制信号；以及用于根据偏移控制信号控制输入电压，并将受控输入电压提供给显示面板的电源。

