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Lee et al.

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(54) **ELECTROLUMINESCENT DISPLAY PANEL
 AND METHOD FOR OPERATING THE
 SAME**

2001/0035863 A1 11/2001 Kimura

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(57) **ABSTRACT**

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Dec. 29, 2001	(KR)	2001-87831

(51) **Int. Cl.**
G09G 3/30 (2006.01)

(52) **U.S. Cl.** **345/76; 315/169.3**

(58) **Field of Classification Search** **345/76-81;**
315/169.3; 340/825

See application file for complete search history.

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Electroluminescent display panel and method for operating the same. The electroluminescent display panel having a plurality of unit pixels defined by a plurality of gatelines, and a plurality of sourcelines running perpendicular to each other, the unit pixel including a first switching device, a capacitor having a first terminal connected to an output terminal of the first switching device, and a second terminal connected to a power source voltage terminal, a second switching device connected to the power source voltage terminal, an electroluminescent part, and a light emission suppressing part connected to the one end of the capacitor for turning off the electroluminescent part for a preset period during a period before the present frame is operated, by receiving an enable signal that causes discharge of the capacitor and discharging a charge stored in the capacitor, thereby fabricating a high definition display.

17 Claims, 10 Drawing Sheets

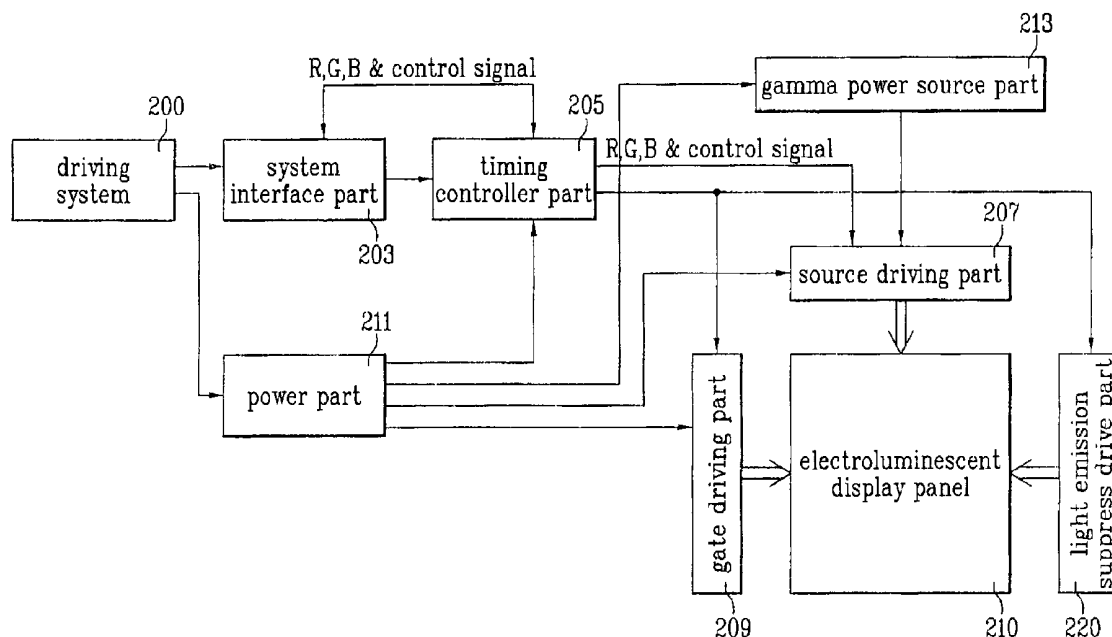


FIG. 1
Related Art

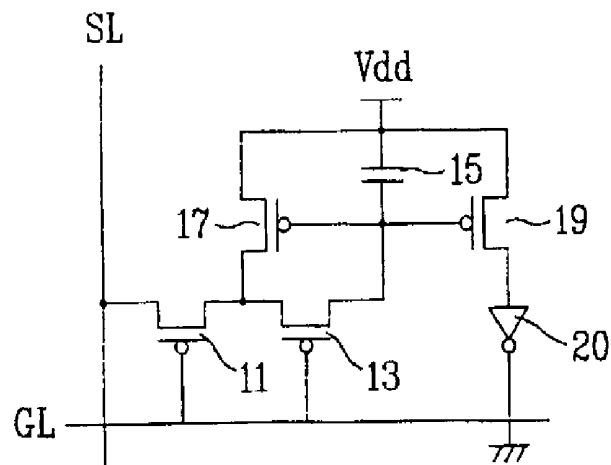


FIG. 2
Related Art

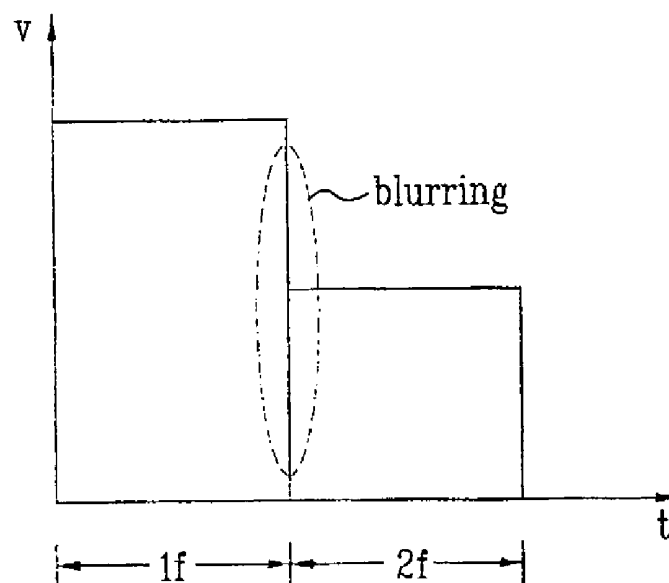


FIG. 3

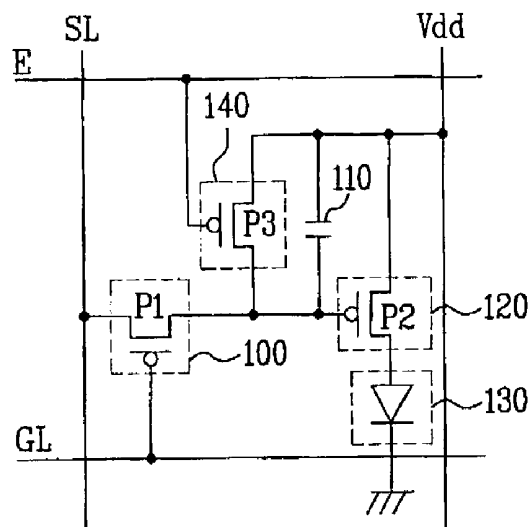


FIG. 4

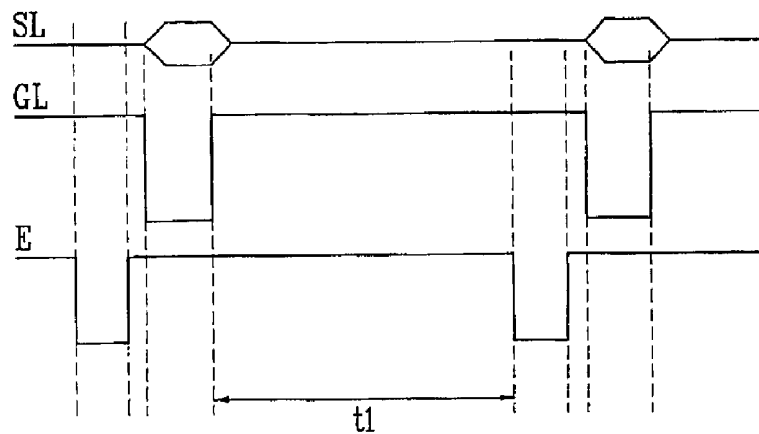


FIG. 5

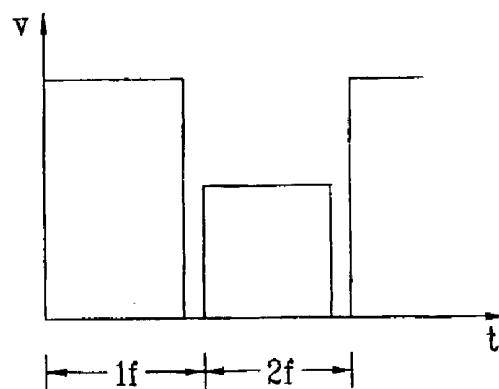


FIG. 6

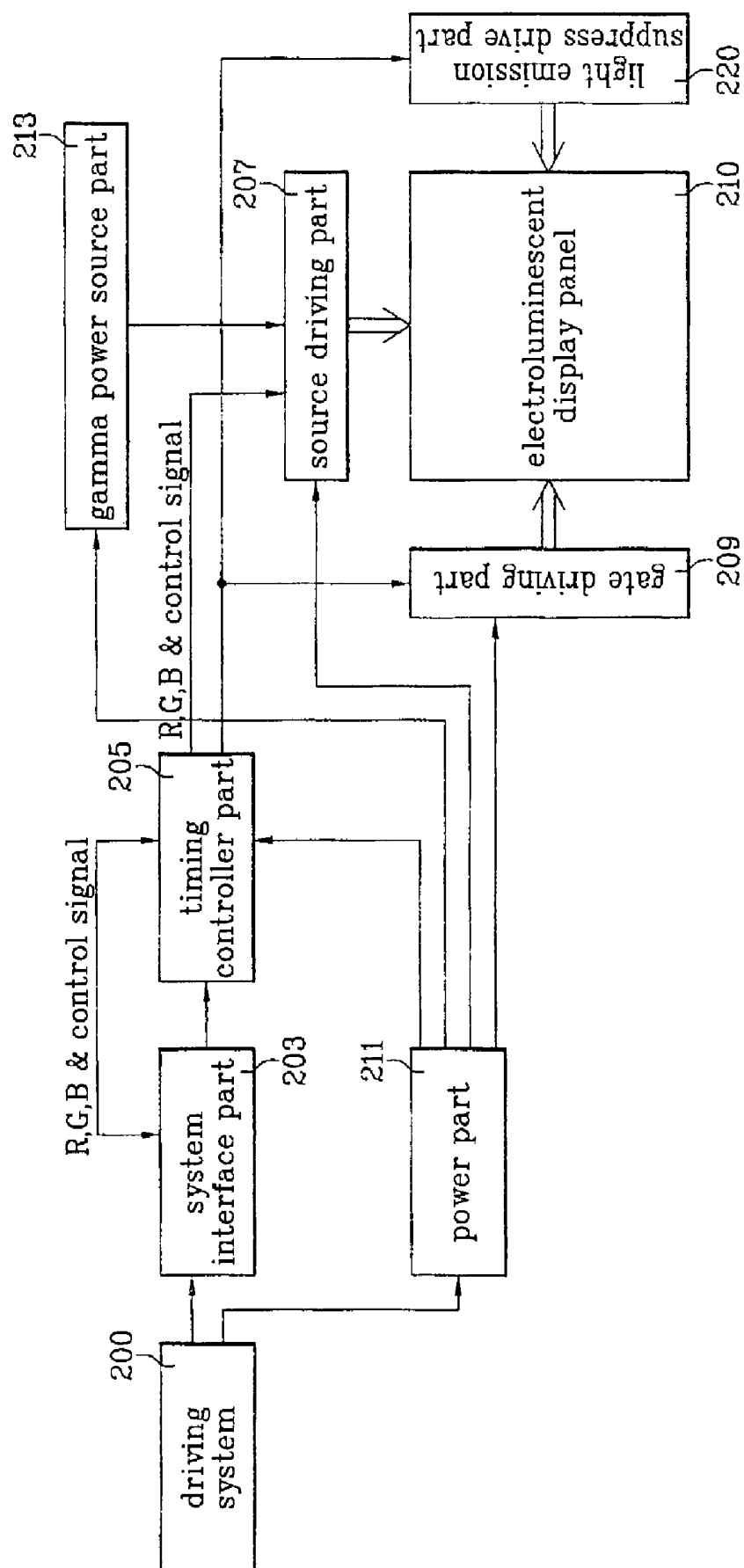


FIG. 7

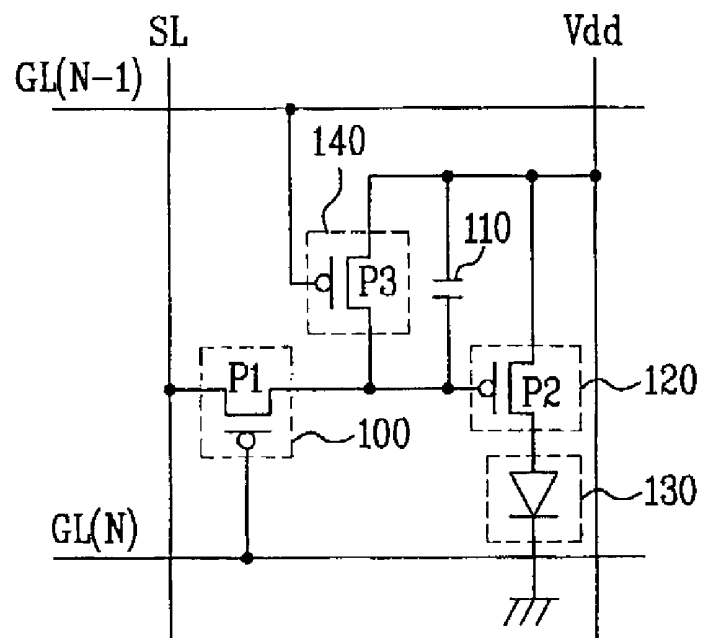


FIG. 8

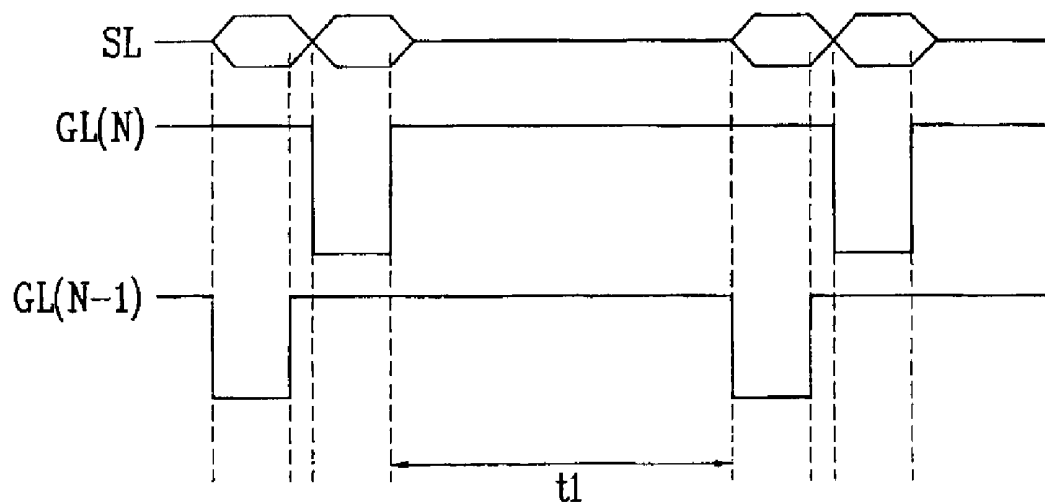


FIG. 9

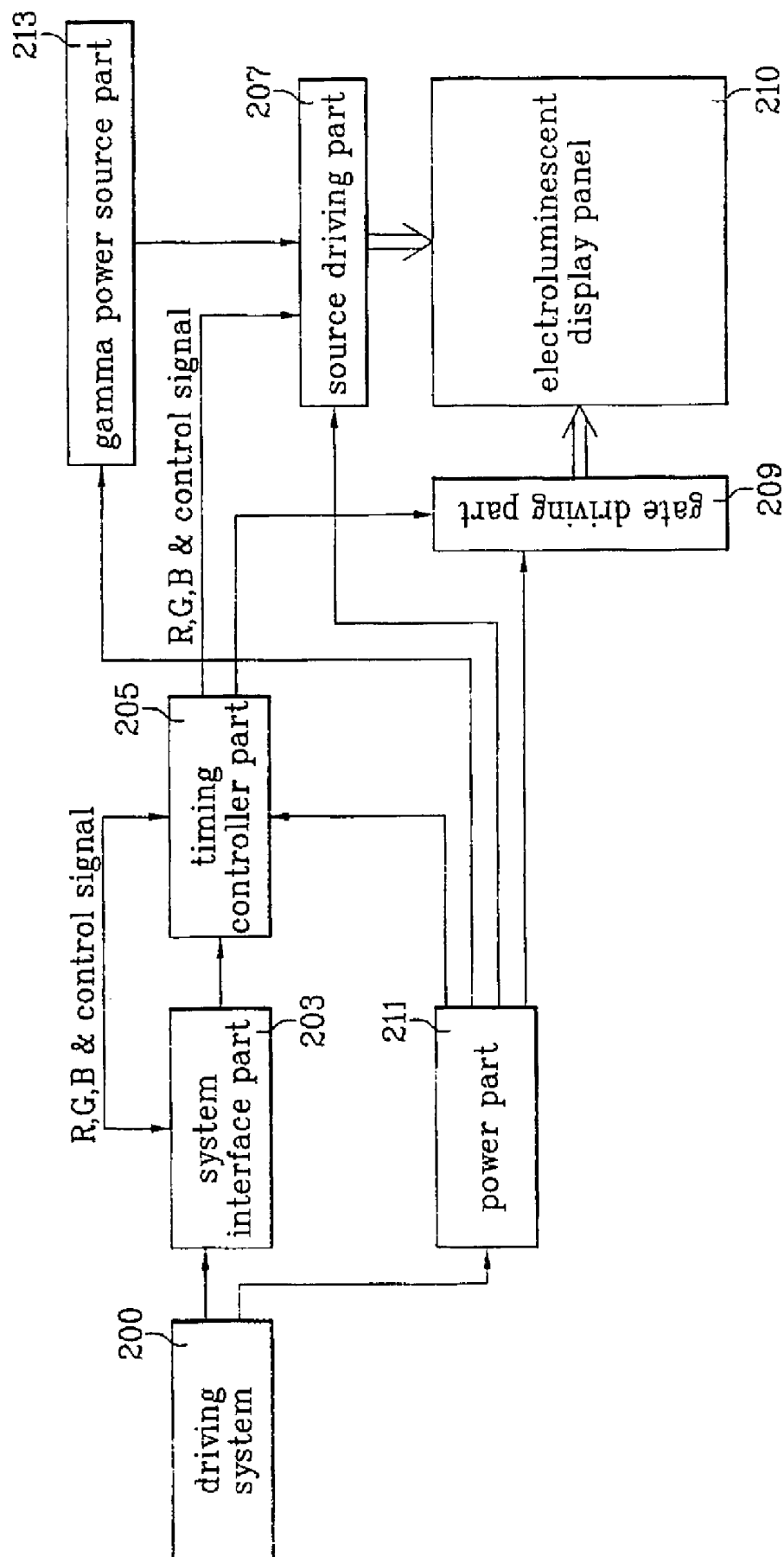


FIG. 10

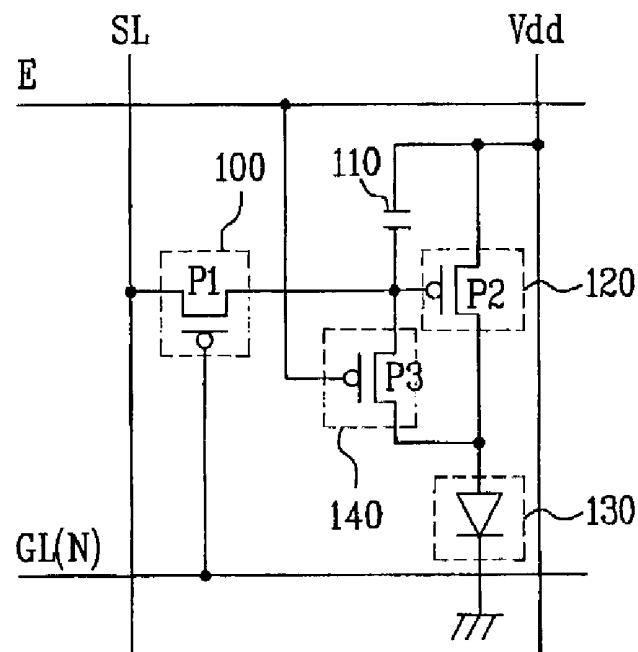


FIG. 11

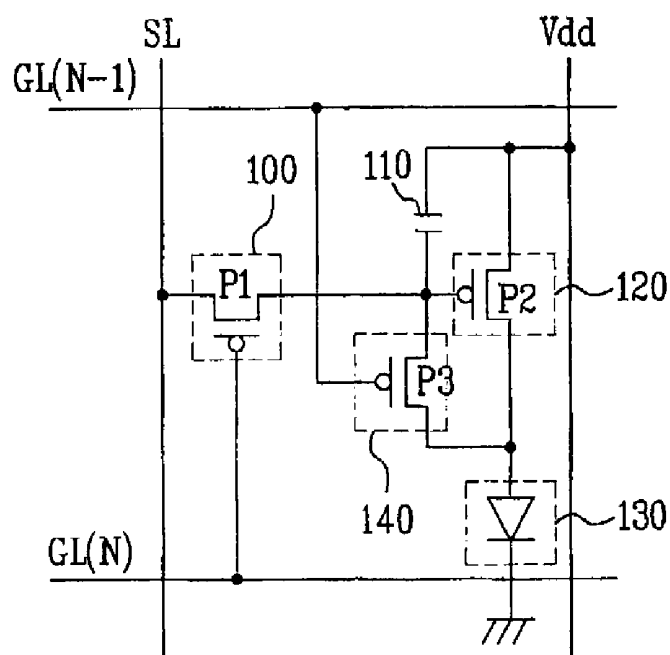


FIG. 12

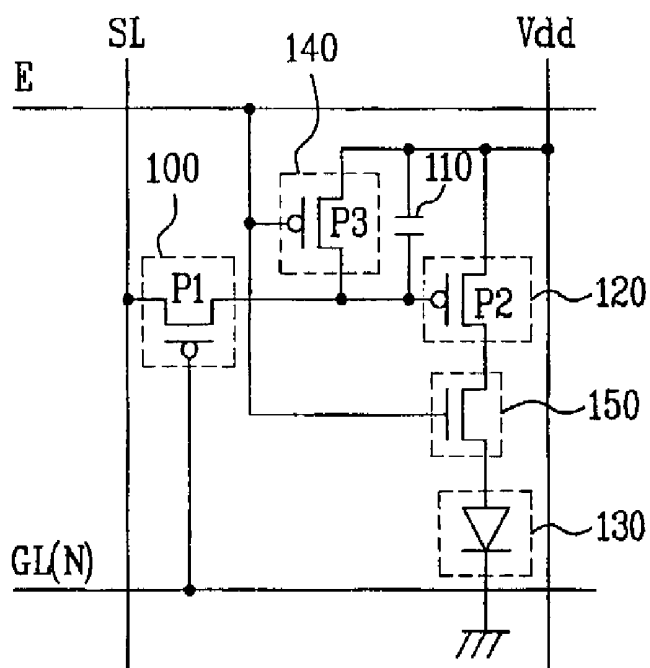


FIG. 13

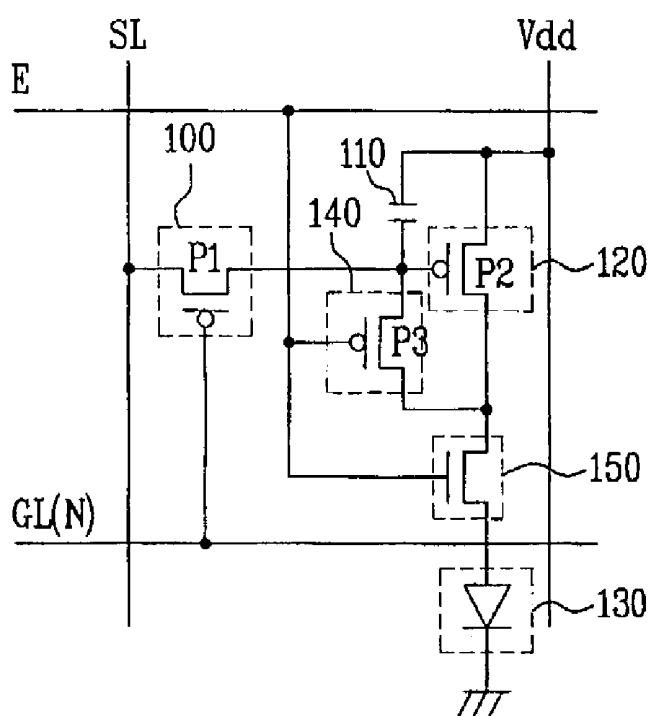


FIG. 14

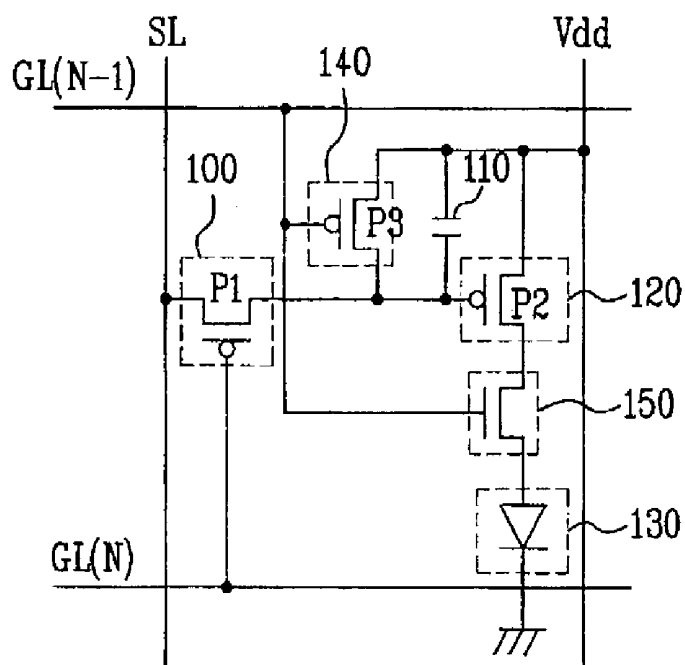


FIG. 15

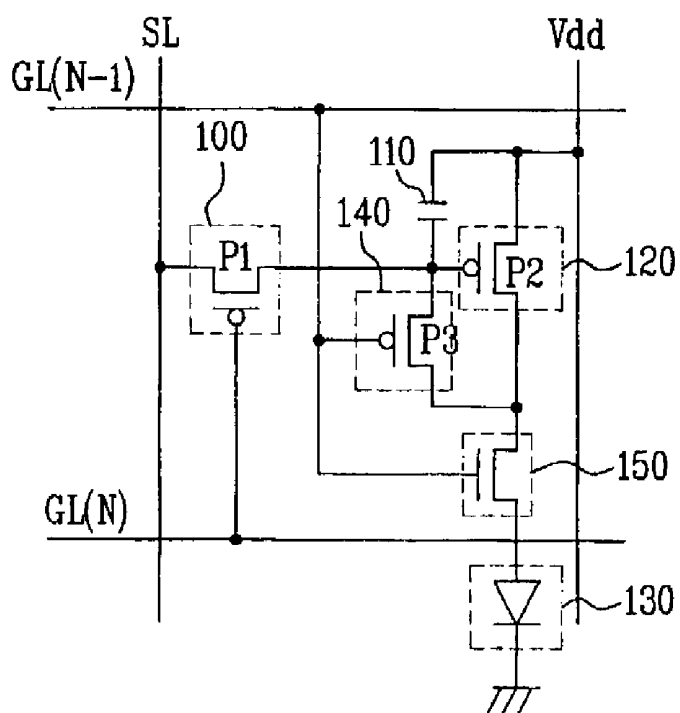


FIG. 16

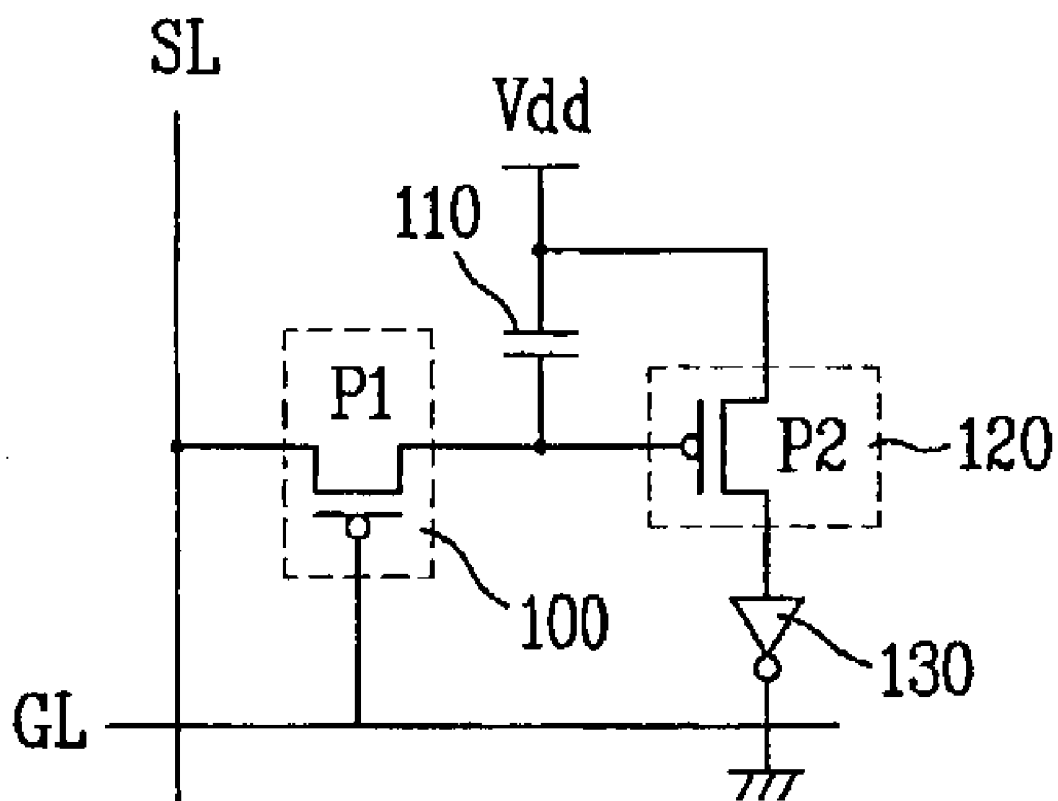
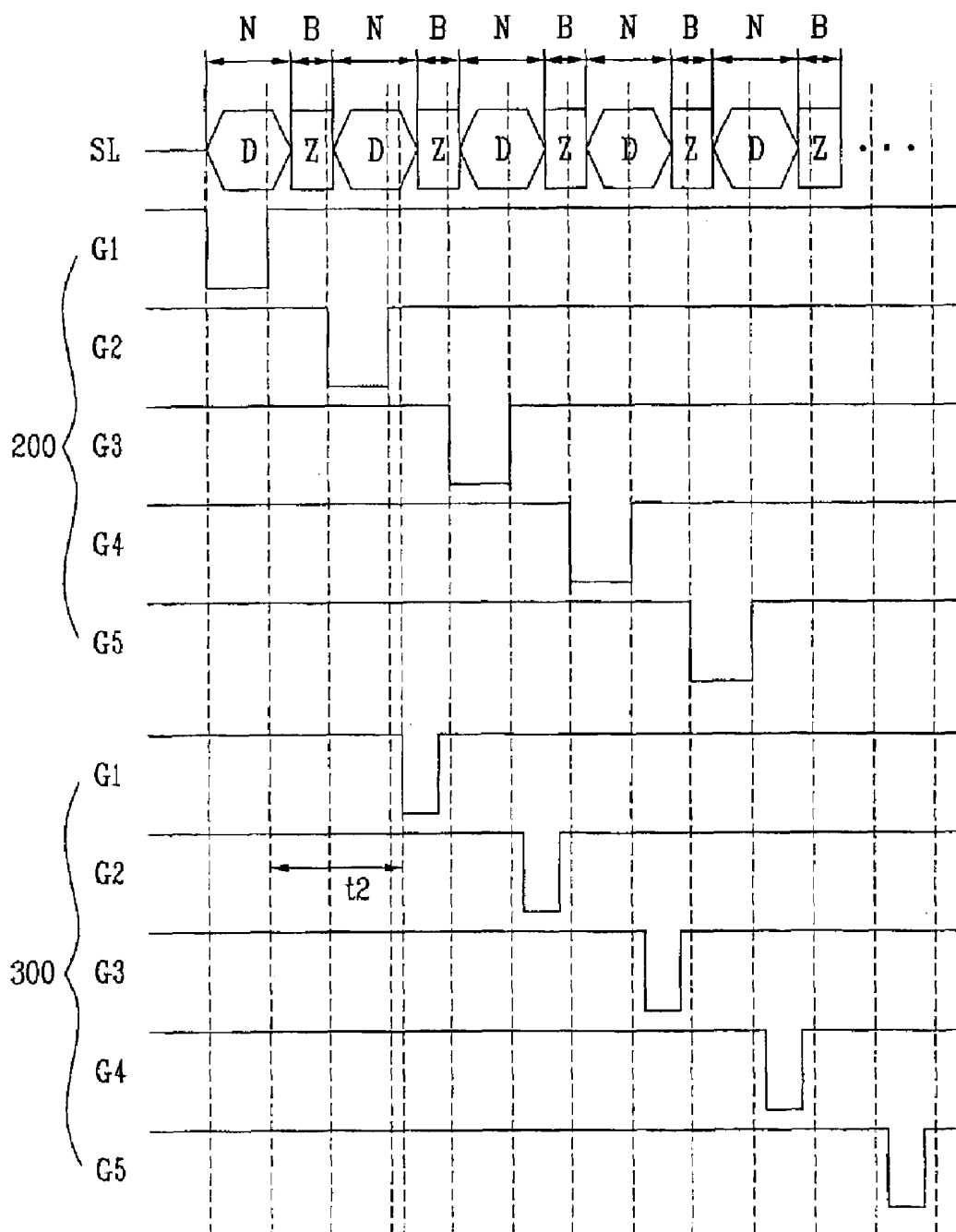


FIG. 17



ELECTROLUMINESCENT DISPLAY PANEL AND METHOD FOR OPERATING THE SAME

This application claims the benefit of the Korean Application Nos. P2001-86065 filed on Dec. 27, 2001 and P2001-87831 filed on Dec. 29, 2001, which are hereby incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electroluminescent device, and more particularly, to an electroluminescent display panel, in which an operation of an electroluminescent device is controlled, for fabricating a high definition display; and a method for operating the same.

2. Background of the Related Art

The electroluminescent device has been given attention as a next generation flat display because in comparison with a passive device which requires reception of light for displaying a picture, the electroluminescent device has advantages of a fast response speed, an excellent luminance as it is an active device, a simple structure permitting easy fabrication, light weight, and a thin and compact size.

The electroluminescent device has a wide variety of applications, such as liquid crystal display (LCD) back lights, mobile stations, car navigation systems (CNS), notebook computers, and wall mounting type television (TV) sets.

In the electroluminescent device, there are inorganic electroluminescent devices, and organic electroluminescent devices according to a material of the electroluminescent device.

The organic electroluminescent device is a device in which a charge is injected into an organic thin layer between an electron injected electrode and a hole injected electrode, to form one pair of an electron and a hole, which collapse to emit light. The inorganic electroluminescent device is a device in which an electron accelerated by a strong field is collided with a luminescent material, to excite the luminescent material, and to make the luminescent material luminescent as the luminescent material drops down to a base state.

A related art electroluminescent display panel will be explained. FIG. 1 illustrates a circuit of unit pixel of a related art electroluminescent display panel.

Referring to FIG. 1, the unit pixel is provided with first and second switching devices **11** and **13** connected to a sourceline SL in series for switching a data signal in response to a signal applied to a gateline GL, a capacitor **15** having a first terminal connected to an output terminal of the second switching device **13**, a second terminal connected to a power source terminal Vdd, for having a data voltage received through the first and second switching devices **11** and **13** charged thereto, a third switching device **17** connected between an output terminal of the first switching device **11** and the second terminal of the capacitor **15**, to be controllable by the voltage induced at the first terminal of the capacitor **15**, and a fourth switching device **19** connected between the power source terminal Vdd and an electroluminescent device **20**, to be switchable by a voltage induced at the first terminal. The first to fourth switching devices **11**, **13**, **17**, and **19** are PMOS transistors.

The operation of the related art electroluminescent display panel will be explained.

When an enable signal is provided to the gateline GL, and a sink current is provided to the sourceline SL, a data voltage pertinent to the signal is charged to the capacitor **15** through first and second switching devices **11** and **13**.

Next, a current pertinent to the current through the third switching device **17** is provided to the electroluminescent device **20** through the fourth switching device **19**, to make the electroluminescent device luminescent for a certain time period.

Thereafter, even if the gate signal that controls the first and second switching devices **11** and **13** is cut, the electroluminescent device remains luminescent as the data voltage stored in the capacitor is discharged.

However, the related art electroluminescent display panel has the following problems.

Pixel sourcelines running throughout the entire region of the electroluminescent display panel have resistance components, and there are parasitic capacitors between the gatelines and the sourcelines, resulting in requiring a long time for storing the data voltage to the capacitor **15** if a weak sink current flows to the sourceline SL to provide a data voltage pertinent to the weak sink current, in the present frame after a prior frame is finished. Accordingly, as shown in FIG. 2, blurring of the picture occurs in the present frame 2/ after the prior frame is finished, which hinders fabrication of high definition of the electroluminescent display panel.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to an electroluminescent display panel, and a method for operating the same that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An advantage of the present invention is to provide an electroluminescent display panel, and a method for operating the same, in which a data voltage can be charged to a capacitor quickly for displaying a high definition picture.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the electroluminescent display panel having a plurality of unit pixels defined by a plurality of gatelines, and a plurality of sourcelines running perpendicular to each other, the unit pixel including a first switching device responsive to a signal applied to the gateline for switching a data signal, a capacitor having a first terminal connected to an output terminal of the first switching device, and a second terminal connected to a power source voltage terminal, for having a data voltage provided thereto through the first switching device and charged thereto, a second switching device connected to the power source voltage terminal for being switched by a voltage induced at the first terminal of the capacitor, an electroluminescent part for emitting a light by the power source voltage provided through the second switching device, and a light emission suppressing part connected to the one end of the capacitor for turning off the electroluminescent part for a preset period during a period before the present frame is operated, by receiving an enable signal that causes discharge of the capacitor and discharging a charge stored in the capacitor.

The first switching device, the second switching device, or the light emission suppressing part includes a PMOS transistor.

The light emission suppressing part is connected in parallel with the capacitor.

The light emission suppressing part may be connected between a first terminal and a second terminal of the capacitor, or between an output terminal of the first switching device and an output terminal of the second switching device.

The enable signal is provided from the light emission suppress drive part which makes to provide a low level pulse to the plurality of gatelines before application of the enable signal.

The enable signal is a signal enabled by a front end gateline of the plurality of gatelines.

The electroluminescent display panel further including a third switching device between the second switching device and the electroluminescent part operative in response to the enable signal.

The third switching device includes an NMOS transistor.

In another aspect of the present invention, there is provided a method for operating an electroluminescent display panel having a plurality of unit pixels each defined by gatelines and sourcelines, both arranged to cross each other, first and second switching devices, a capacitor, an electroluminescent part, and a light emission suppressing part, including providing an erase signal to the light emission suppressing part for discharging a voltage charged in the capacitor of a prior frame before the present frame is operative, and applying an enable signal to the gateline, and applying a data voltage to the sourceline, for charging the data voltage to the capacitor through the first switching device, and turning on the second switching device to provide a power source voltage to the electroluminescent part to make the electroluminescent part to emit a light for a time period.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention:

In the drawings:

FIG. 1 illustrates a circuit of unit pixel of a related art electroluminescent display panel;

FIG. 2 illustrates a timing diagram for explaining a problem of the related art electroluminescent display panel;

FIG. 3 illustrates a circuit of an electroluminescent display panel in accordance with a first referred embodiment of the present invention;

FIGS. 4 and 5 illustrate operative time diagrams of FIG. 3;

FIG. 6 illustrates a block diagram of an electroluminescent display panel inclusive of the unit pixel in FIG. 3;

FIG. 7 illustrates a circuit in accordance with a second embodiment of the present invention;

FIG. 8 illustrates an operative time diagram of FIG. 7;

FIG. 9 illustrates a block diagram of an electroluminescent display panel inclusive of the unit pixel in FIG. 7;

FIGS. 10–15 illustrate circuits in accordance with one of a third to eighth embodiments of the present invention;

FIG. 16 illustrates a circuit for applying an operating method in accordance with another embodiment of the present invention; and

FIG. 17 illustrates an operative timing diagram for explaining a method for operating an electroluminescent display panel by using the circuit in FIG. 16 in accordance with the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

First Embodiment

FIG. 3 illustrates a circuit of an electroluminescent display panel in accordance with a first embodiment of the present invention. FIGS. 4 and 5 illustrate operative time diagrams of FIG. 3. FIG. 6 illustrates a block diagram of an electroluminescent display panel inclusive of the unit pixel in FIG. 3.

Referring to FIG. 3, a plurality of unit pixels are provided, which are defined at every crossing part of a plurality of gatelines GL and sourcelines SL running perpendicular to the gatelines. Only one unit cell is shown in the drawing.

The unit cell of the electroluminescent display panel in accordance with a first embodiment of the present invention includes a first switching device 100 for switching a data signal in response to a signal provided to the gateline GL, a capacitor 110 having a first terminal connected to an output terminal of the first switching device 100, and a second terminal connected to a power source terminal Vdd for having a data voltage received through the first switching device 100 charged thereto, a second switching device 120 connected to the power source terminal for being switched by a voltage induced at the first terminal of the capacitor, an electroluminescent part 130 for emitting light by a voltage from the power source through the second switching device 120, and a light emission suppressing part 140 for turning off the electroluminescent part 130 for a preset time period by receiving an enable signal E' which makes the capacitor 110 to discharge for a preset time period before the present frame and making a charge stored in the capacitor of a prior frame discharged.

The first and second switching devices 100 and 120, and the light emission suppressing part 140 include PMOS transistors P1, P2, and P3, respectively.

The light emission suppressing part 140 is connected between the first terminal and the second terminal of the capacitor 110 in parallel with the capacitor 110. The light emission suppressing part 140 prevents a discharge voltage of the capacitor 110 from transmitting to the electroluminescent part 130 in response to an enable signal generated by the light emission suppress drive part (not shown) which provides a fixed low level pulse before an enable signal is provided to each of the plurality of gatelines.

The light emission suppressing part 140 is applicable to the related art electroluminescent display panel with four thin film transistors (TFTs) also, i.e., the light emission suppressing part 140 is connected between the first and second terminals of the capacitor 15 (see FIG. 15) and a

separate enable signal E is applied to the light emission suppressing part 140 for driving the light emission driving part 140.

The operation of the electroluminescent display panel having the foregoing unit pixel will be explained, with reference to a timing diagram.

Referring to FIGS. 4 and 5, before operation of the present frame, i.e., before the gate signal is enabled, if the light emission suppress drive part (not shown) provides an erase signal E to the light emission suppressing part 140 on both sides of the capacitor 110, a voltage charged in the capacitor 110 in a prior frame is discharged fully, such that the electroluminescent part 130 does not emit any more light from the light emission suppressing part 140.

Then, when the present frame is operated, i.e., when an enable signal is provided to the gateline GL, and a data voltage is provided to the sourceline SL, the data voltage is charged in the capacitor 110 through the first switching device 100 and turns on the second switching device 120, such that a power is provided from the power source terminal Vdd to the electroluminescent part 130, to make the electroluminescent part 130 luminescent.

Referring to FIG. 5, according to above operation, the data voltage stored in the capacitor 110 in the prior frame 1f is discharged fully during a certain period after operation of the prior frame 1f, but before operation of the present frame 2f, to prevent the electroluminescent part 130 from emitting light, thereby suppressing the blurring of the picture, to improve the picture quality.

When it is assumed that a time period from a time point the electroluminescent part 130 starts to emit light to a time point the erase signal E is provided before the next frame is t1, adjustment of luminance can be made by adjusting t1 which in turn adjusts a light emission period of the electroluminescent part 130.

Moreover, when it is required to drive the electroluminescent part 130 in a low power mode, t1 is made short, for an effective low power mode operation which matching an overall gray balance.

An entire system of the electroluminescent display panel of the foregoing unit pixel will be explained.

Referring to FIG. 6, the electroluminescent display panel includes a system interface part 203 for inducing application of red, green, blue (R, G, B) signals, data signals from a driving system 200, to the electroluminescent display panel 210, a timing controller part 205 for receiving the data signal from the system interface part 203 and producing different control signals and data for stable operation of the electroluminescent display panel 210, a source driving part 207 for converting the data signal from the timing controller part 205 into analog signal, and applying the data signal to the sourcelines SL of the electroluminescent display panel 210, a gate driving part 209 for receiving a display control signal from the timing controller part 205, and applying a pulse voltage to the gatelines, a power part 211 for receiving a power from the driving system 200 and applying required power to respective parts, a gamma power source part 213 for receiving a power branched from the power part 211 for producing a reference voltage required for the digital/analog conversion of the source driving part 207, and a light emission suppress drive part 220 for controlling the light emission suppressing part 140 which turns off the electroluminescent part 130 in the foregoing unit pixel for a preset time period under the control of the timing controller part 205.

Second Embodiment

FIG. 7 illustrates a circuit in accordance with a second embodiment of the present invention. FIG. 8 illustrates an operative time diagram of FIG. 7. FIG. 9 illustrates a block diagram of an electroluminescent display panel inclusive of the unit pixel in FIG. 7.

The second embodiment of the present invention is characterized in that an erase signal E, an enable signal of the light emission suppressing part 140, is enabled by a front gateline GL(N-1) of a plurality of gatelines GL(N). That is, the light emission suppress drive part 220 is not required for controlling the light emission suppressing part 140, but the light emission suppress part 140 is controlled for itself in initializing the capacitor 110.

The light emission suppressing part 140 in the second embodiment is applicable to the related art electroluminescent display panel with four TFTs also, i.e., the light emission suppressing part 140 is connected between the first and second terminals of the capacitor 15 (see FIG. 15) and a separate enable signal E is applied to the light emission suppressing part 140 for driving the light emission driving part 140.

The operation of the electroluminescent display panel of the present invention will be explained, with reference to FIG. 8.

Referring to FIG. 8, when a gateline GL(N-1) of a prior stage is enabled, a video signal is stored in a pixel connected to the gateline GL(N-1).

Then, referring to FIG. 8, the pixel connected to the gateline GL(N) drives the light emission suppressing part 140, to discharge the voltage stored in the capacitor 110 of a prior frame fully, to initialize the capacitor 110.

Then, when the gateline GL(N) is enabled and the data voltage is provided to the sourceline SL, the data voltage is charged to the capacitor 110 through the first switching device 100, and, at the same time, turns on the second switching device 120 such that the electroluminescent part 130 emits light for a time period as a power is provided thereto from the power source terminal VDD.

FIG. 9 illustrates a block diagram of an electroluminescent display panel of the unit pixel in FIG. 7, wherefrom the light emission suppress drive part 220 in FIG. 6 is omitted. That is, the erase signal 'E', an enable signal from the light emission suppressing part 140, is enabled by a front end gateline GL(N-1) of the plurality of gatelines GL(N), the light emission suppress drive part 220 shown in FIG. 6 is not required.

Third Embodiment

FIG. 10 illustrates a circuit in accordance with a third embodiment of the present invention, of which timing diagram is the same with FIG. 4.

Referring to FIG. 10, the electroluminescent display panel in accordance with a third embodiment of the present invention is identical to the first embodiment, except that the light emission suppressing part 140 is connected between an output terminal of the first switching device 100 and an output terminal of the second switching device 120.

In the electroluminescent display panel, before the present frame is operated, i.e., before the gate signal is enabled, if the light emission suppress drive part (not shown) provides an erase signal E to the light emission suppressing part 140, the light emission drive part 140 comes into operation, to initialize a data voltage stored in the capacitor 110 of a prior frame to a value in the vicinity of a threshold voltage of the

second switching device **120**, thereby suppressing the light emission of the electroluminescent part **130**.

Then, when the present frame is operated, i.e., when the gateline GL is enabled and a data voltage, for an example, a video signal with a low luminance, is provided to the sourceline SL, though the charging to the capacitor takes a long time period in the related art, the data voltage can be charged to the capacitor **110** quickly in the embodiment of the present invention, thereby permitting fabrication of a high definition electroluminescent display panel.

The electroluminescent suppressing part **140** in accordance with a third embodiment of the present invention is applicable to the related art electroluminescent display panel having 4-TFT structure.

Fourth Embodiment

FIG. **11** illustrates a circuit in accordance with a fourth embodiment of the present invention, of which timing diagram is the same with FIG. **8**.

Referring to FIG. **11**, the fourth embodiment is a combination of the embodiments explained in association with FIGS. **7** and **10**.

That is, the light emission suppressing part **140** is connected between an output terminal of the first switching device **100** and an output terminal of the second switching device **120**, and the erase signal E, an enable signal from the light emission suppressing part **140**, is enabled by a front end gateline GL(N-1) of a plurality of gatelines GL(N).

The light emission suppressing part **140** in the fourth embodiment is applicable to the related art electroluminescent display panel with four TFTs, also.

Fifth to Eighth Embodiments

FIGS. **12~15** illustrate circuit diagrams in accordance with fifth to eighth embodiments of the present invention, respectively.

The electroluminescent display panel in accordance with fifth to eighth embodiments of the present invention further include third switching device to the electroluminescent display panel in accordance with first to fourth embodiments of the present invention, respectively.

The third switching device **150** is driven in response to a signal 'E' or GL(N-1) the same with the light emission suppressing part **140**, and fitted between the second switching device **120** and the electroluminescent part **130**.

The third switching device **150** is an NMOS transistor, for being turned off when the light emission suppressing part is driven, and for being turned on when the light emission suppressing part **140** is not driven, for more effective control of the electroluminescent part **130**.

The light emission suppressing part **140** and the third switching device in one of the fifth to eighth embodiments is applicable to the related art electroluminescent display panel with four TFTs, also.

Another Embodiment of the Operating Method

FIG. **16** illustrates a circuit for applying an operating method in accordance with another embodiment of the present invention. FIG. **17** illustrates an operative timing diagram for explaining a method for operating an electroluminescent display panel by using the circuit in FIG. **16** in accordance with the present invention.

Referring to FIG. **16**, the electroluminescent display panel for applying the another embodiment operating method of

the present invention includes a matrix of a plurality of unit pixels defined by a plurality of gatelines GL running in a horizontal direction and a plurality of sourcelines SL running in a vertical direction to cross the gatelines GL.

Only one unit pixel is shown in the drawing. Though not shown, there are a gate driving part at a side of the electroluminescent display panel for enabling the gatelines GL, a data driving part on the panel for enabling the datelines SL, and a timing controller part for providing signals for enabling the gate driving part and the data driving part.

The electroluminescent display panel includes a first switching device **100** for switching the data signal in response to a signal provided to the gateline GL in the unit pixel, a capacitor **110** having a first terminal connected to an output terminal of the first switching device **100**, and a second terminal connected to a power source terminal Vdd, for being charged by a data voltage received through the first switching device **100**, a second switching device **120** connected to the power source terminal for being switched by a voltage induced at the first terminal of the capacitor **110**, and an electroluminescent part **130** for emitting a light by a voltage through the second switching device **120**.

The first, and second switching devices **100** and **200** are PMOS transistors P1 and P2, respectively.

A method for operating an electroluminescent display panel of the present invention explained hereafter is by using a circuit in FIG. **16** which has no separate light suppressing part. Operation of the electroluminescent display panel having a unit pixel as shown in FIG. **16** will be explained, with reference to a timing diagram.

Referring to FIG. **17**, in application of a data voltage, i.e., a video picture signal to the sourceline SL, a normal period 'N' and a black data period 'B' are designated, and a real data voltage 'D' is applied to the normal period 'N', and a black data voltage 'Z' is applied to the black data period 'B'.

The normal period 'N' and the black data period 'B' may be set up by timing control of the timing controller (not shown) which provides signals required for the gate driving part and the data driving part.

The black data voltage 'Z', for turning off the second switching device **120**, is a voltage that can discharge the capacitor **110** at fixed intervals, preferably in a range from (a power source voltage—a threshold voltage of the second switching device) to (the power source voltage).

The operation will be explained in more detail. The gate driving part provides gate signals G1~G5 to the plurality of gatelines GL progressively for turning on the first switching devices **100**, and the data driving part provides a real data signal 'D' to the electroluminescent display panel through the first switching devices **100** driven by the gate signals G1~G5. Then, as a charge for the real data signal D is charged to the capacitor **110**, the second switching device **120** is turned on, to make the electroluminescent part **130** to emit a light for a time period.

In the method for operating an electroluminescent display panel in accordance with a preferred embodiment of the present invention, every frame is divided into a normal period 'N' and a black data period 'B', to which a real data voltage 'D' and a black data voltage 'Z' are applied.

Each of the gate signals G1~G5 is divided into a first gate signal **200** and a second gate signal **300**, and loaded on the gateline GL, and the first gate signal **200** is applied to the normal period 'N' and the second gate signal **300** is applied to the black data period 'B'.

The real data voltage D is applied to the sourceline in the normal period N and the black data voltage Z is applied to

the source line in the black data period B. The electroluminescent display panel displays a picture while turning off the electroluminescent part 130 repeatedly at fixed intervals.

When it is assumed that a time period from a time point the electroluminescent part 130 starts to emit a light, i.e., a time point the first gate signal 200 is applied, to a time point the electroluminescent part 130 is turned off, i.e., the second gate signal is applied, is t₂, a luminance control is possible by controlling the time period t₂, that in turn controls a light emitting time period of the electroluminescent part 130.

When it is required to drive the electroluminescent part 130 in a low power mode, the t₂ time period is controlled to be short, for making an effective low power mode driving while matching an overall gray scale balance.

As has been explained, the electroluminescent display panel, and a method for operating the same of the present invention have the following advantages.

First, by preventing light emission of the electroluminescent part 130 by full discharge of the data voltage stored in the capacitor 110 of a prior frame during a period after operation of the prior frame 1f, but before the operation of the present frame 2f, blurring on the screen can be suppressed, thereby improving a picture quality.

Second, the controlling of a light emission period of the electroluminescent part 130 by controlling a time period t₁ until an erase signal E is provided before the next frame permits control of a luminance.

Third, when a low power mode driver of the electroluminescent part 130 is required, the t₁ time period is controlled to be short, for making an effective low power mode drive while matching an overall gray scale balance.

A high definition electroluminescent display panel can be fabricated, which can make the capacitor charges a data voltage quickly and display if a video signal with a low luminance is provided in the present frame.

It will be apparent to those skilled in the art that various modifications and variations can be made in the device for controlling spreading of liquid crystal, and method for fabricating an LCD of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. An electroluminescent display panel having a plurality of unit pixels defined by a plurality of gatelines, and a plurality of source lines running perpendicular to the plurality of gatelines, the unit pixel comprising:

a first switching device responsive to a signal applied to a gateline for switching an analog data signal applied to a source line;

a capacitor having a first terminal connected to an output terminal of the first switching device, and a second terminal connected to a power source voltage terminal, for having the analog data signal provided thereto through the first switching device and charged thereto;

a second switching device connected to the power source voltage terminal for being switched by a voltage induced at the first terminal of the capacitor;

an electroluminescent part for emitting a light by the power source voltage provided through the second switching device;

a light emission suppressing part connected to one end of the capacitor for turning off the electroluminescent part for a preset period during a period before a present frame is operated, by receiving an enable signal that

causes discharge of the capacitor and discharging a charge stored in the capacitor; and

a third switching device connected between an output terminal of the second switching device and the electroluminescent part, the third switching device is driven in response to the enable signal the same as the light emission suppressing part.

2. An electroluminescent display panel as claimed in claim 1, wherein the first switching device, the second switching device, and the light emission suppressing part includes a first type transistor.

3. An electroluminescent display panel as claimed in claim 2, wherein the first type transistor is a PMOS transistor.

4. An electroluminescent display panel as claimed in claim 1, wherein the light emission suppressing part is connected in parallel with the capacitor.

5. An electroluminescent display panel as claimed in claim 1, wherein the light emission suppressing part is connected between a first terminal and a second terminal of the capacitor.

6. An electroluminescent display panel as claimed in claim 1, wherein the light emission suppressing part is connected between an output terminal of the first switching device and an output terminal of the second switching device.

7. An electroluminescent display panel as claimed in claim 1, wherein the enable signal is provided from a light emission suppress drive part which provides a low level pulse to the plurality of gatelines before application of the enable signal.

8. An electroluminescent display panel as claimed in claim 1, wherein the enable signal is a signal enabled by a front end gateline of the plurality of gatelines.

9. An electroluminescent display panel as claimed in claim 1, wherein the third switching device includes a second type transistor.

10. An electroluminescent display panel as claimed in claim 9, wherein the second type transistor is an NMOS transistor.

11. A method for operating an electroluminescent display panel having a plurality of unit pixels each defined by gatelines and source lines, the gatelines and source lines arranged to cross each other, first and second switching devices, a capacitor, an electroluminescent part, and a light emission suppressing part, the method comprising:

providing an erase signal to a third switching device and the light emission suppressing part for discharging an analog data signal charged in the capacitor during a prior frame before a present frame is operative, the light emission suppressing part connected to one end of the capacitor, and the third switching device connected between an output terminal of the second switching device and the electroluminescent part; and

applying an enable signal to the gatelines and applying an analog data signal to source lines, for charging the analog data signal to the capacitor through the first switching device, and turning on the second switching device to provide a power source voltage to the electroluminescent part to make the electroluminescent part to emit a light for a time period.

12. A method as claimed in claim 11, wherein the first and second switching devices are PMOS transistors.

13. A method for operating an electroluminescent display panel having a plurality of unit pixels, gatelines and source lines, the gatelines and the source lines arranged to cross each other, a first switching device for switching an analog

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data signal provided to the sourcelines in response to a signal provided to the gatelines, a capacitor for having the analog data signal provided through the first switching device and charged thereto, a second switching device connected to a power source voltage terminal for being switched by a voltage induced at the capacitor, an electroluminescent part for emitting a light by a power source voltage provided through the second switching device, the method comprising:

dividing a frame into a normal period and a black period; 10
 applying an analog real data signal to the sourcelines during the normal period and applying an analog black data signal to the sourcelines during the black period; enabling gatelines of the plurality of unit pixels progressively in the normal period and the black period; and 15
 in the enabling of the gatelines, applying the analog black data signal to the gatelines during the black period, for

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displaying a picture while turning off the electroluminescent part repeatedly at fixed intervals.

14. A method as claimed in claim 13, wherein the gate signal is loaded on the gatelines, with the gate signal divided into a first gate signal and a second gate signal.

15. A method as claimed in claim 14, wherein the first gate signal is applied during the normal period, and the second gate signal is applied during the black period.

16. A method as claimed in claim 13, wherein the analog black data signal is a voltage for turning off the second switching device.

17. A method as claimed in claim 16, wherein the analog black data signal ranges from a threshold voltage of the second switching device to the power source voltage.

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摘要(译)

电致发光显示面板及其操作方法。电致发光显示面板具有由多个栅极线限定的多个单位像素，以及彼此垂直延伸的多个源极线，单位像素包括第一开关装置，电容器具有连接到第一开关装置的输出端子的第一端子。第一开关装置，连接到电源电压端子的第二端子，连接到电源电压端子的第二开关装置，电致发光部分，以及连接到电容器一端的发光抑制部分，用于关闭电源电压端子通过接收使电容器放电并释放存储在电容器中的电荷的使能信号，在操作当前帧之前的时段期间的预设时段内的电致发光部分，从而制造高清晰度显示器。

