



US 20060290646A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2006/0290646 A1**
(43) **Pub. Date: Dec. 28, 2006**(54) **LIQUID CRYSTAL DISPLAY OF LINE ON GLASS TYPE****Publication Classification**(51) **Int. Cl.**
G09G 3/36 (2006.01)
(52) **U.S. Cl.** **345/100**(75) **Inventor: Pil Sung Kang, Gumi-si (KR)**

Correspondence Address:
BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747 (US)

(73) **Assignee: LG. Philips LCD Co., Ltd.**(21) **Appl. No.: 11/475,124**(22) **Filed: Jun. 27, 2006**(30) **Foreign Application Priority Data**

Jun. 28, 2005 (KR) 10-2005-0056552

(57) **ABSTRACT**

A line-on-glass type liquid crystal display device, which includes a gate drive integrated circuit mounted on a liquid crystal display panel for supplying a gate signal to the liquid crystal display panel, and a data drive integrated circuit for supplying a data voltage to the liquid crystal display panel. Further, the data drive integrated circuit includes an output circuit having effective output channels to which the data voltage is supplied and dummy output channels to which at least any one of the data voltage and a common voltage is supplied. Also included is a channel selecting part for selectively supplying any one of the data voltage and the common voltage to at least anyone of the dummy output channels.

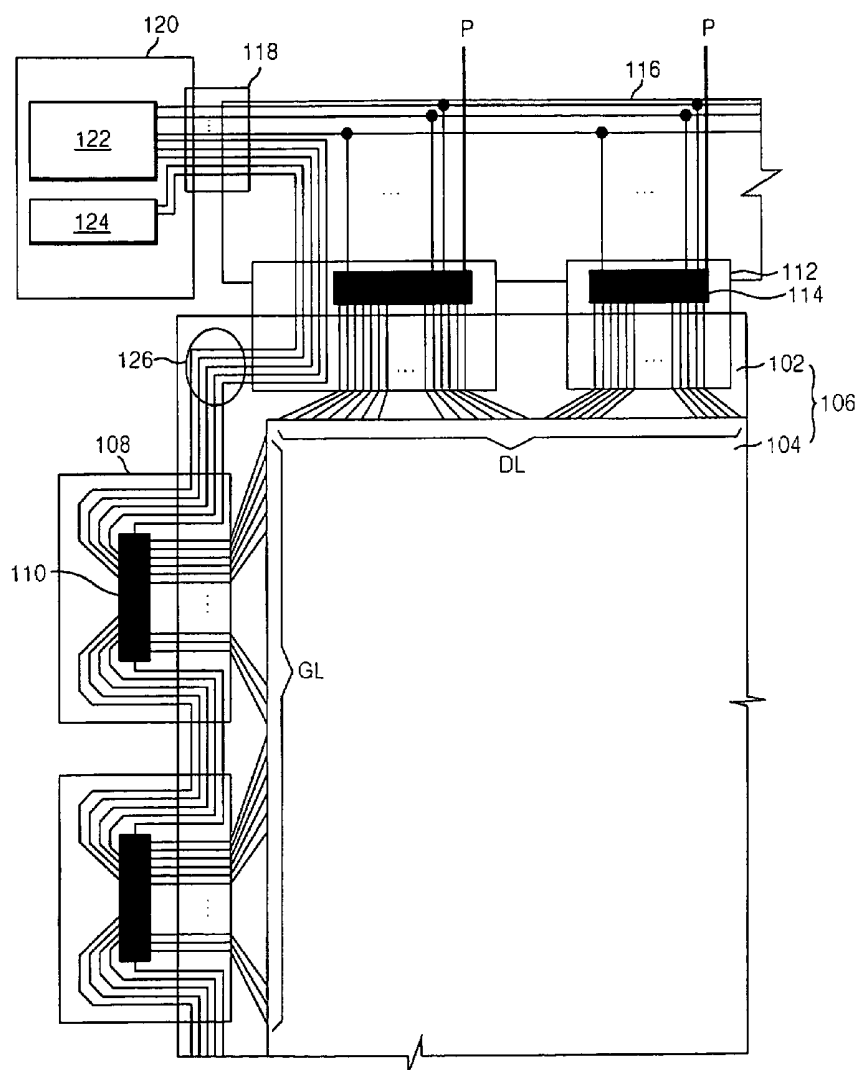


FIG. 1
RELATED ART

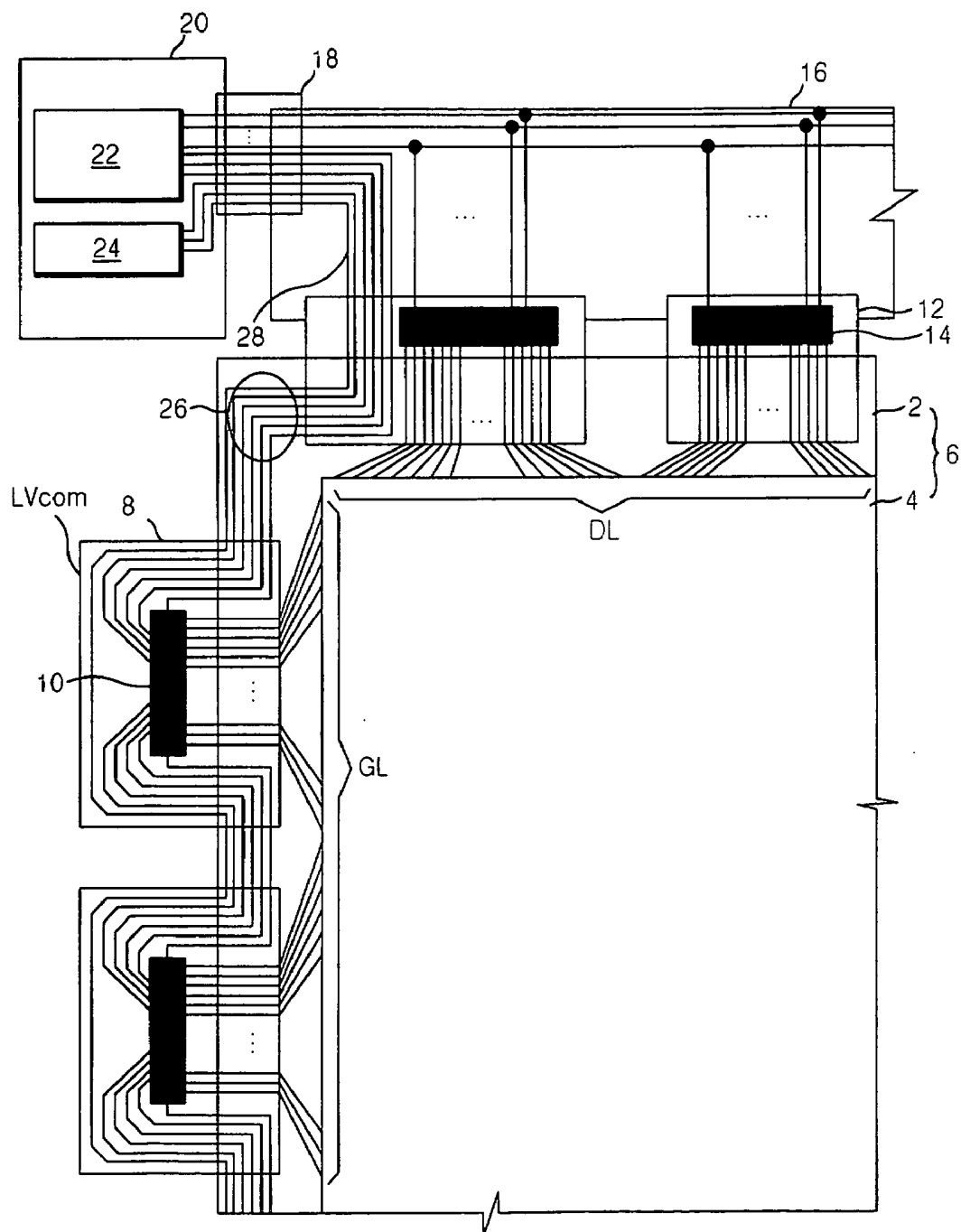


FIG. 2
RELATED ART

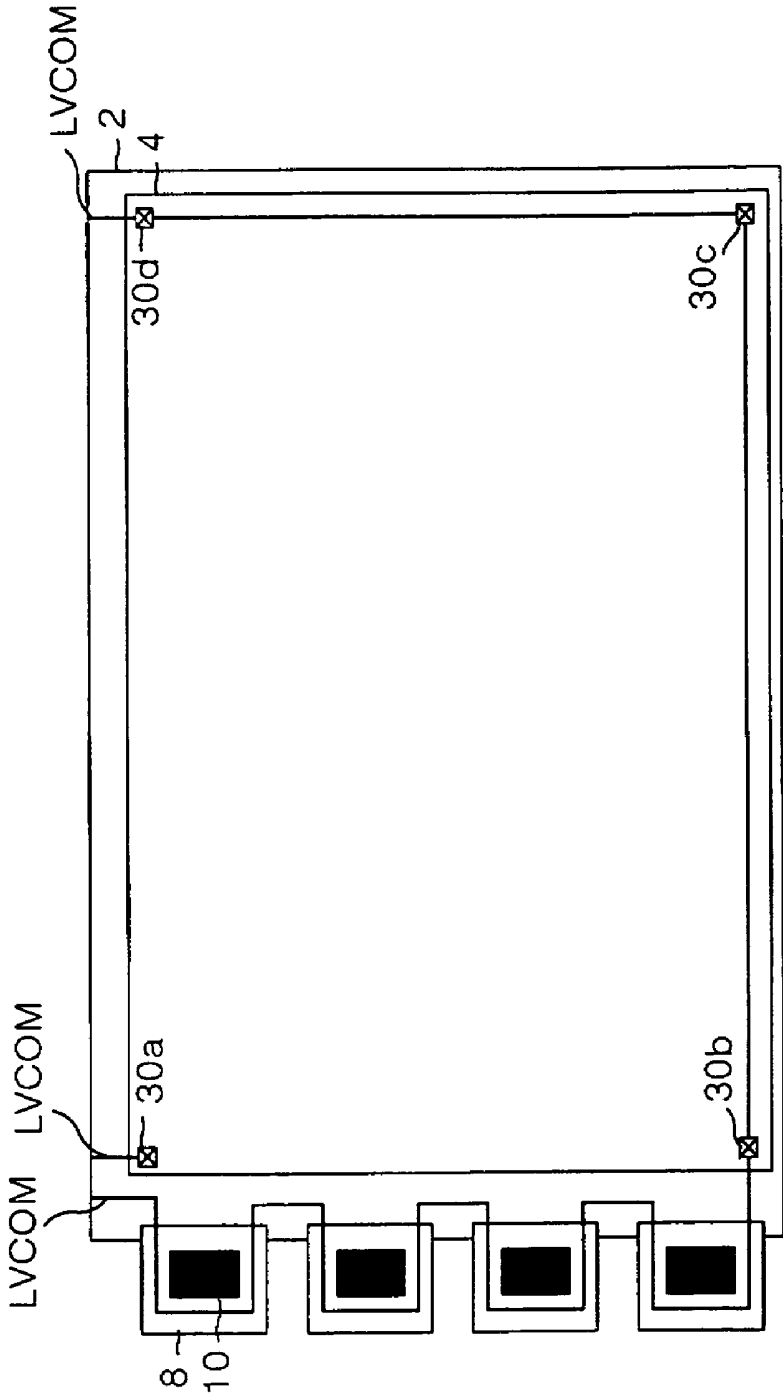
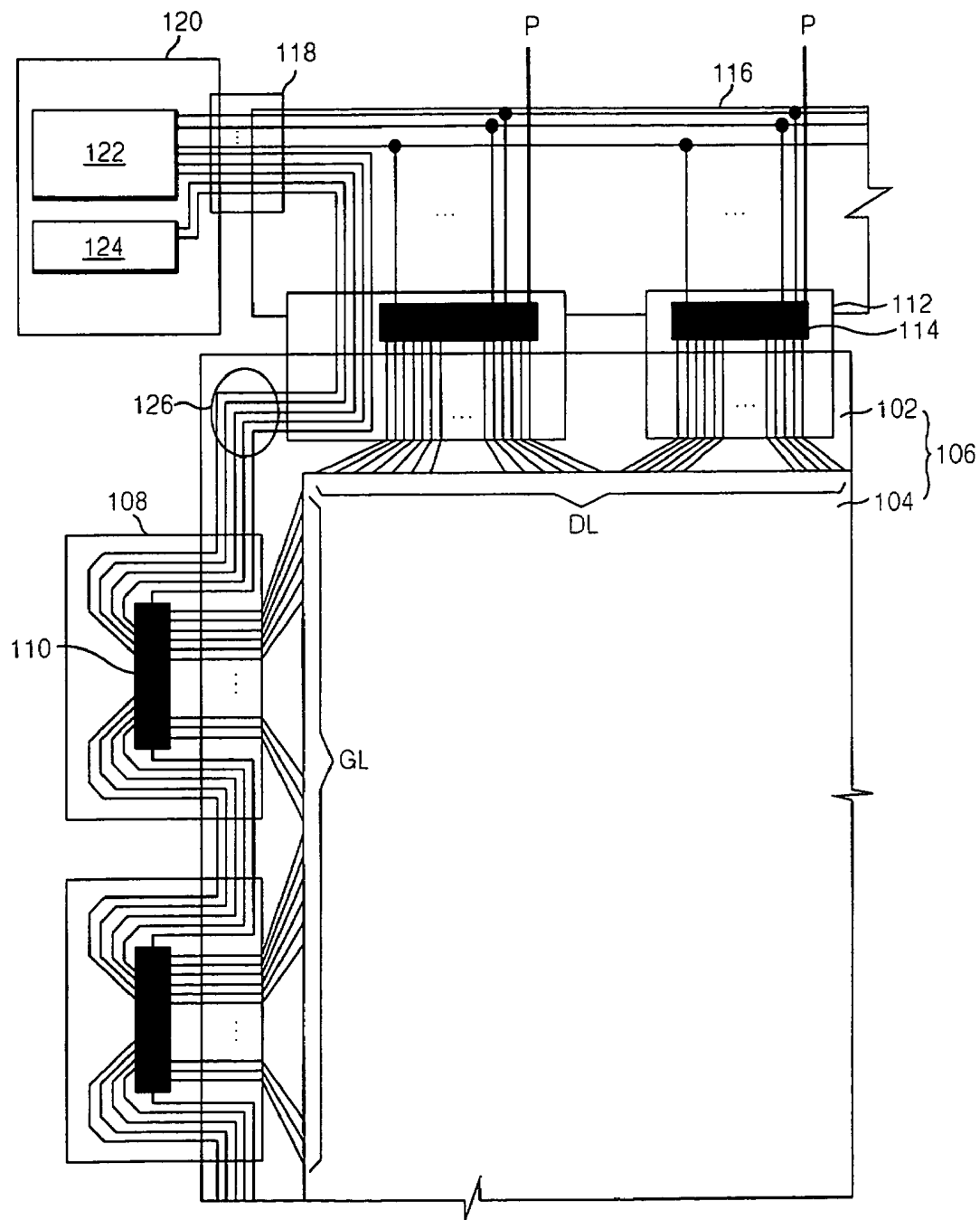


FIG. 3



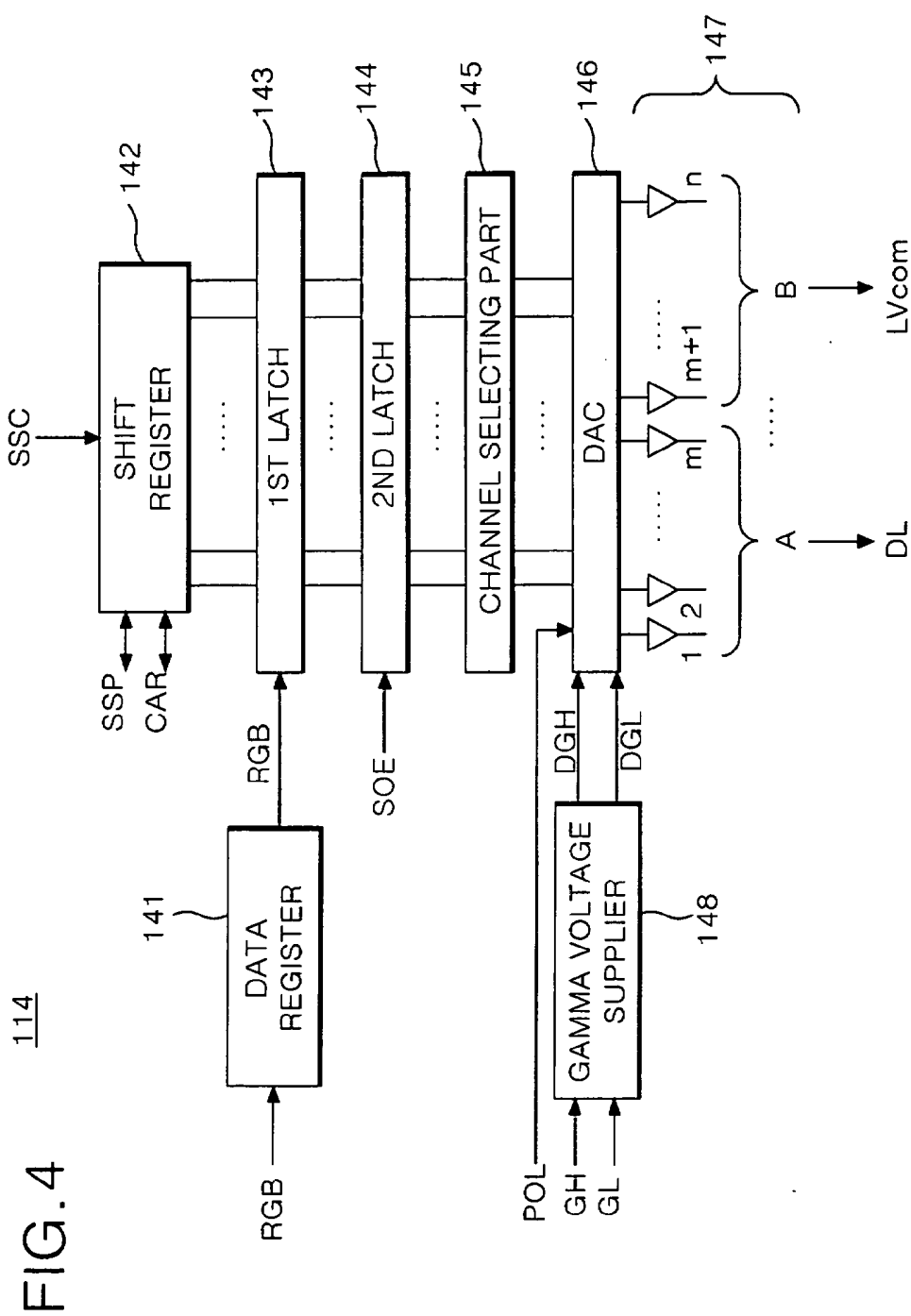


FIG. 5

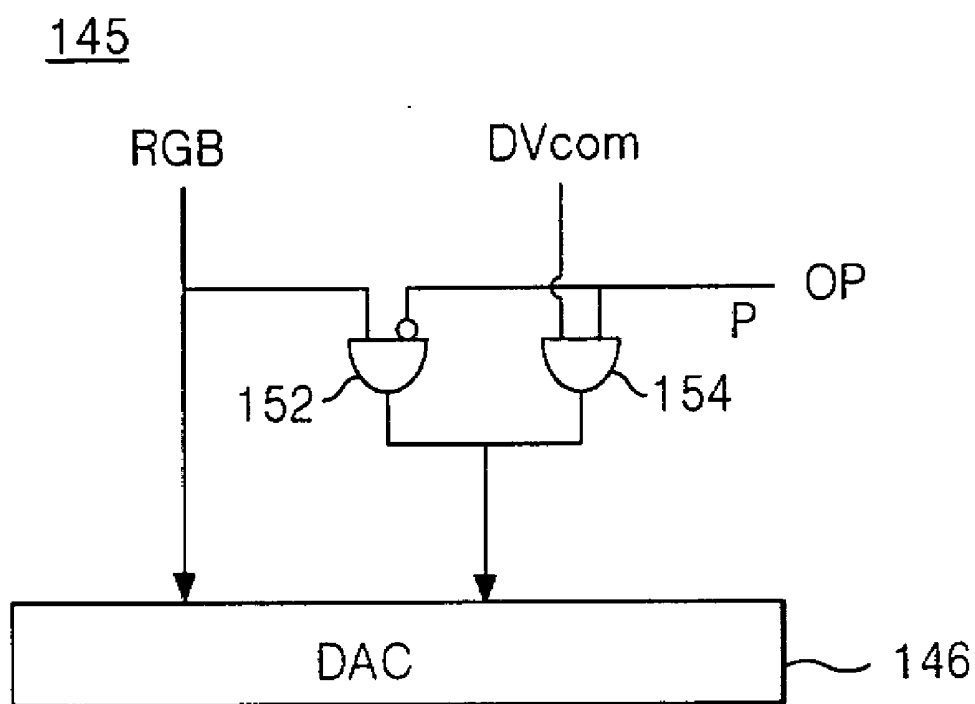
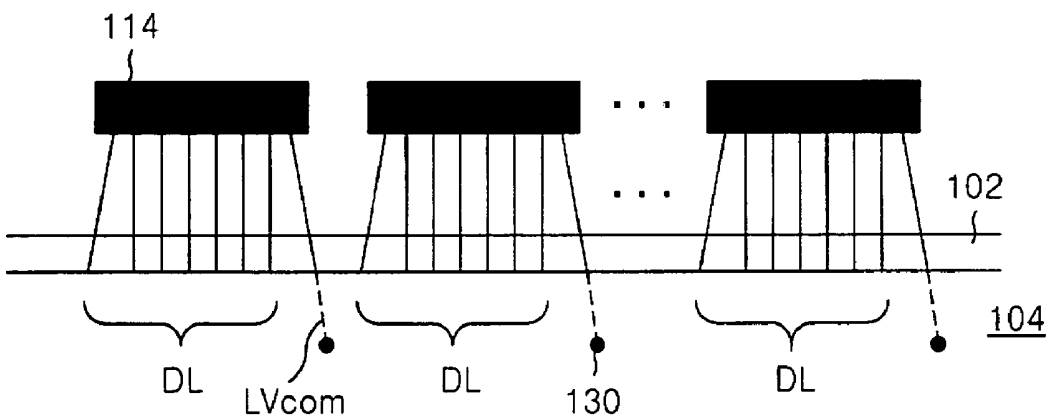


FIG. 6



LIQUID CRYSTAL DISPLAY OF LINE ON GLASS TYPE

[0001] This application claims priority to Korean Patent Application No. 10-2005-0056552 filed on Jun. 28, 2005, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a liquid crystal display device, and more particularly to a line-on-glass type liquid crystal display device that prevents a deterioration in a picture quality of the liquid crystal display device.

[0004] 2. Description of the Related Art

[0005] A liquid crystal display device controls the light transmittance of liquid crystal having dielectric anisotropy by using an electric field, thereby displaying a picture. Further, the liquid crystal display device includes a liquid crystal display panel having liquid crystal cells arranged in a matrix shape and a drive circuit for driving the liquid crystal display panel. The liquid crystal display panel controls the light transmittance of the cells in accordance with a pixel signal, thereby displaying a picture.

[0006] In addition, the drive circuit includes a gate driver for driving gate lines of the liquid crystal display panel, a data driver for driving data lines, a timing controller for controlling the drive timing of the gate driver and the data driver, and a power supply for supplying power signals required for driving the liquid crystal display panel and the drive circuits.

[0007] Further, the data and gate drivers are divided into a plurality of integrated circuits (ICs) made in a chip form. Each of the integrated drive ICs is mounted in an IC area opened on a TCP (tape carrier package) or is mounted on a base film of the TCP by a COF (chip on film) method. Each IC is also electrically connected to the liquid crystal display panel by a TAB (tape automated bonding) method. Further, the drive IC can also be directly mounted on the liquid crystal display panel by a COG (chip on glass) method.

[0008] The drive ICs mounted on the liquid crystal display panel by the COG method receive pixel data and control signals from the timing controller mounted on a main PCB (power control board) and power signals from the power supply through line-on-glass (LOG) type signal lines which are formed in the liquid crystal display panel and a corresponding FPC (flexible printed circuit).

[0009] Recently, even when the drive ICs are connected to the liquid crystal display panel through the TCP, the PCB is removed by adopting the LOG signal lines, thereby making the liquid crystal display device thinner. That is, the gate PCB which transmits relatively less signals is removed, and the signal lines which supply gate control signals and power signals to the gate drive ICs are formed in the LOG type lines on the liquid crystal display panel. Accordingly, the gate drive ICs mounted on the TCP receive the gate control signals from the timing controller and the power signals from the power supply through the following arrangement: main PCB→FPC→data PCB→data TCP→LOG signal line→gate TCP.

[0010] In more detail, FIG. 1 is a diagram representing an LOG type liquid crystal display device of the related art

where a gate PCB is removed. As shown, the LOG type liquid crystal display device includes a main PCB 20 having a timing controller 22 and a power supply 24, a data PCB 16 connected to the main PCB 20 through a FPC 18, a data TCP 12 where a data drive IC 14 is mounted and which is connected between the data PCB 16 and a liquid crystal display panel 6, and a gate TCP 8 where a gate drive IC 10 is mounted and which is connected to the liquid crystal display panel 6.

[0011] Further, the liquid crystal display panel 6 is divided into a thin film transistor array substrate 2 and a color filter array substrate 4, which are bonded with a liquid crystal there between. Also, liquid crystal cells independently driven by the thin film transistors are respectively provided at each area defined by the crossing of gate lines GL and data lines DL of the thin film transistor array substrate 2. Each thin film transistor supplies a pixel signal from the data line DL to the liquid crystal cell in response to a scan signal from the gate line GL.

[0012] In addition, the data drive ICs 14 are connected to the data lines DL through a data pad of the liquid crystal display panel 6 and the data TCP 12, thereby supplying a data signal to the data line DL. Similarly, the gate drive ICs 10 are connected to the gate lines GL through a gate pad of the liquid crystal display panel 6 and the gate TCP 8, thereby supplying a gate signal to the gate line GL.

[0013] A LOG signal line group 26 include signal lines for power signals from the power supply 24 such as a gate low voltage, gate high voltage, common voltage, etc., and gate control signals supplied from the timing controller 22. On the other hand, as shown in FIG. 2, in an edge area of the color filter array substrate 4, a plurality of silver Ag dots 30a to 30d are formed to supply a common voltage to the common electrode formed in the color filter array substrate 4. That is, a common voltage VCOM from the common line LVCOM is supplied to the common electrode of the color filter array substrate 4 through the silver dots 30a and 30b.

[0014] However, as shown, the silver dots 30a to 30d are located in corner areas of the color filter array substrate 4. That is, in the related art, the part that supplies the common voltage VCOM is insufficient (e.g., too small of an area), therefore a picture quality deterioration phenomenon such as cross-talk, a greenish color, etc. is generated.

SUMMARY OF THE INVENTION

[0015] Accordingly, one of the objects of the present invention is to provide a line-on-glass type liquid crystal display device that prevents a deterioration in picture quality.

[0016] To achieve these and other objects of the invention, a line-on-glass type liquid crystal display device according to an aspect of the present invention includes a gate drive integrated circuit mounted on a liquid crystal display panel for supplying a gate signal to the liquid crystal display panel, and a data drive integrated circuit for supplying a data voltage to the liquid crystal display panel. Further, the data drive integrated circuit includes an output circuit having effective output channels to which the data voltage is supplied and dummy output channels to which at least any one of the data voltage and a common voltage is supplied. Also included is a channel selecting part for selectively supplying

any one of the data voltage and the common voltage to at least any one of the dummy output channels.

[0017] A line-on-glass type liquid crystal display device according to another aspect of the present invention includes a liquid crystal display panel having pixel cells arranged in a matrix shape, a gate drive integrated circuit mounted on the liquid crystal display panel for supplying a gate signal to the pixel cells, and a data drive integrated circuit mounted on the liquid crystal display panel for supplying a data voltage and a common voltage to the pixel cells.

[0018] In yet another aspect, the present invention provides a liquid crystal display device including a liquid crystal display panel having a thin film transistor array substrate and a color filter array substrate sandwiching a liquid crystal therebetween, a data drive circuit for supplying a data voltage to data lines of the liquid crystal display panel, a gate drive circuit for supplying a gate signal to gate lines crossing the data lines of the liquid crystal display panel, and a timing controller for providing control signals to the data and gate drive circuits so as to selectively drive thin film transistors included in the thin film transistor array substrate. Further, the data drive circuit includes an output circuit having a first set of output channels for supplying a data voltage to the data lines and having a second set of output channels for supplying a common voltage to the color filter array substrate.

[0019] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] These and other objects of the invention will be apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings, in which:

[0021] **FIG. 1** is a diagram representing a line-on-glass type liquid crystal display device of the related art;

[0022] **FIG. 2** is a diagram representing a common voltage of a common line being supplied to a color filter array substrate through a silver dot;

[0023] **FIG. 3** is a diagram representing a line-on-glass type liquid crystal display device in accordance with an embodiment of the present invention;

[0024] **FIG. 4** is a diagram representing a data drive IC in **FIG. 3**;

[0025] **FIG. 5** is a diagram representing a circuit configuration of a channel selecting part of the data drive IC shown in **FIG. 4**; and

[0026] **FIG. 6** is a diagram representing a common voltage being supplied to a color filter array substrate through the data drive IC.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0028] Turning first to **FIG. 3**, which is a diagram representing an LOG type liquid crystal display device in accordance with an embodiment of the present invention. As shown, the LOG type liquid crystal display device includes a main PCB **120** having a timing controller **122** and a power supply **124**. The display device also includes a data PCB **116** connected to the main PCB **120** through a FPC **118**, a data TCP **112** where a data drive IC **114** is mounted and which is connected between the data PCB **116** and a liquid crystal display panel **106**, and a gate TCP **108** where a gate drive IC **110** is mounted and which is connected to the liquid crystal display panel **106**.

[0029] Further, the liquid crystal display panel **106** is divided into a thin film transistor array substrate **102** and a color filter array substrate **104**, which are bonded with a liquid crystal therebetween. Also, liquid crystal cells independently driven by the thin film transistors are provided at each area defined by the crossing of gate lines GL and data lines DL of the thin film transistor array substrate **102**. Each thin film transistor supplies a pixel signal from the data line DL to the liquid crystal cell in response to a scan signal from the gate line GL.

[0030] In addition, a LOG signal line group **126** includes signal lines for power signals such as a gate low voltage, gate high voltage, common voltage, etc. supplied from the power supply **124**, and gate control signals supplied from the timing controller **122**. Further, the gate drive ICs **110** are connected to the gate lines GL through a gate pad of the liquid crystal display panel **106** and the gate TCP **108**, thereby supplying gate signals to the gate lines GL.

[0031] In addition, the data drive ICs **114** are connected to the data lines DL through a data pad of the liquid crystal display panel **106** and the data TCP **112**, thereby supplying data signals to the data line DL. Further, a common voltage VCOM is supplied to the liquid crystal display panel **106** using a dummy output channel.

[0032] Turning next to **FIG. 4**, which illustrates the data drive IC **114** shown in **FIG. 3**. As shown, the data drive IC **114** includes a data register **141** to which RGB data signals from the timing controller **122** are input, and a shift register **142** for generating a sampling clock. Also included is a first latch **143**, a second latch **144**, a channel selecting part **145**, a digital/analog converter (DAC) **146** and an output circuit **147** connected between the shift register **142** and the data lines DL. A gamma voltage supplier **148** is also connected to the DAC **146**.

[0033] In addition, the data register **141** supplies the digital RGB data signals from the timing controller **122** to the first latch **143**. The shift register **142** shifts a source start pulse SSP from the timing controller **122** in accordance with a source sampling clock signal SSC to generate a sampling signal. Further, the shift register **142** shifts the source start pulse SSP to transmit a carry signal CAR to the shift register **142** in the next stage.

[0034] Also, the first latch **143** sequentially samples the digital RGB data signals from the data register **141** in response to the sampling signal, which is sequentially input from the shift register **142**. The second latch **144** latches the data input from the first latch **143**, and then simultaneously outputs the latched data in response to a source output enable signal SOE from the timing controller **122**.

[0035] In addition, the channel selecting part **145** selects a channel for supplying a data voltage to data lines DL and a channel for supplying a common voltage to the liquid crystal display panel **106** in response to a channel selection signal input from the outside. To this end, the channel selecting part **145**, as shown in **FIG. 5**, includes an option pin OP to which a channel selection signal P is supplied, and first and second AND gates **152**, **154**.

[0036] The option pin OP is, for example, selectively connected to a voltage source and a ground to have a binary logic value of 2 bits. Accordingly, the channel selection signal P supplied to the channel selecting part **145** through the option pin OP has a value of '0' or '1'. In addition, as shown in **FIG. 5**, a first terminal of the first AND gate **152** receives the digital RGB data signals and a second terminal thereof is connected to the option pin OP to which the channel selection signal P is supplied.

[0037] A first terminal of the second AND gate **154** receives a digital common voltage signal DVOM and a second terminal thereof is connected to the option pin OP to which the channel selection signal P is supplied. Also, the first AND gate **152** and the second AND gate **154** are driven in accordance with the logic values which are contrary to each other.

[0038] For example, the first AND gate **152** supplies the digital RGB data signals to the DAC **146** if the channel selection signal P supplied through the option pin OP has a value of '0', and the second AND gate **154** supplies the digital common voltage signal DVOM to the DAC **146** if the channel selection signal P has a value of '1'.

[0039] In addition, the DAC **146** converts the digital RGB data signals from the second latch **144** using a gamma voltage DGH, DGL from the gamma voltage supplier **148**. The gamma voltage DGH, DGL is an analog voltage which corresponds to each gray level of the digital input RGB data signals. That is, the DAC **146** converts the digital common voltage signal DVOM into the analog common voltage and converts the digital RGB data signals into the analog data voltage to be supplied to the output circuit **147**.

[0040] Further, the output circuit **147** includes first to m^{th} effective output channels A connected to the data line DL, and $(m+1)^{\text{th}}$ to n^{th} dummy output channels B. That is, normal analog data voltages are applied to the first to m^{th} effective output channels A, and the common voltage VCOM is output to the $(m+1)^{\text{th}}$ to n^{th} dummy output channels B based on a user's selection.

[0041] In addition, as shown in **FIG. 6**, the common voltage VCOM supplied to the liquid crystal display panel **106** through the dummy output channels B of the data drive IC **114** can be applied to the common electrode of the color filter array substrate **104** through a silver dot **130**. That is, in the present invention, at least any one of the dummy output channels B of the output circuit **147** can act as a common line LVCOM to which the common voltage is supplied.

[0042] In this way, the liquid crystal display in accordance with an embodiment of the present invention includes at least one common line LVCOM through which a common voltage is supplied to the liquid crystal display panel **106** for each data drive IC **114** by having the dummy output channels B of each of the data drive ICs **114** used as the common line LVCOM to which the common voltage is supplied. As

a result, a space to which the common voltage is supplied becomes larger, thereby minimizing the difference of the common voltage in accordance with a location. Accordingly, when realizing a picture, it is possible to prevent a picture quality deterioration phenomenon such as crosstalk, a greenish color, etc.

[0043] As described above, the LOG type liquid crystal display device in accordance with the present invention has the dummy output channels of each of the data drive ICs used as the supply line of the common voltage, and thus the space to which the common voltage is supplied in the liquid crystal display panel is increased. Accordingly, it is possible to prevent the picture quality deterioration phenomenon such as crosstalk, a greenish color, etc.

[0044] Although the present invention has been explained by the embodiments shown in the drawings described above, it should be understood to the ordinary skilled person in the art that the invention is not limited to the embodiments, but rather that various changes or modifications thereof are possible without departing from the spirit of the invention. Accordingly, the scope of the invention shall be determined only by the appended claims and their equivalents.

What is claimed is:

1. A line-on-glass liquid crystal display device, comprising:

a gate drive integrated circuit mounted on a liquid crystal display panel for supplying a gate signal to the liquid crystal display panel; and

a data drive integrated circuit for supplying a data voltage to the liquid crystal display panel,

wherein the data drive integrated circuit includes:

an output circuit including effective output channels to which the data voltage is supplied and dummy output channels to which at least any one of the data voltage and a common voltage is supplied; and

a channel selecting part for selectively supplying any one of the data voltage and the common voltage to at least any one of the dummy output channels.

2. The liquid crystal display device according to claim 1, wherein the channel selecting part includes:

a selection signal receiving part to which a channel selection signal is supplied; and

first and second AND gates for selecting any one of a digital data for generating the data voltage and a digital common signal for generating the common voltage in accordance with a channel selection signal from the selection signal receiving part.

3. The liquid crystal display device according to claim 2, wherein the first and second AND gates are selectively driven in accordance with logic values which are contrary to each other.

4. The liquid crystal display device according to claim 2, further comprising:

a digital/analog converter located between the channel selecting part and the output circuit for converting the digital signal selected by the channel selecting part into an analog signal.

5. The liquid crystal display device according to claim 2, wherein the liquid crystal display panel includes:

a thin film transistor array substrate and a color filter array substrate located to face each other with a liquid crystal therebetween,

wherein the common voltage supplied to the at least any one of the dummy output channel is supplied through a silver dot to a common electrode formed on the color filter array substrate.

6. A line-on-glass liquid crystal display device, comprising:

a liquid crystal display panel including pixel cells arranged in a matrix shape;

a gate drive integrated circuit mounted on the liquid crystal display panel for supplying a gate signal to the pixel cells; and

a data drive integrated circuit mounted on the liquid crystal display panel for supplying a data voltage and a common voltage to the pixel cells.

7. The liquid crystal display device according to claim 6, wherein the data drive integrated circuit includes:

an output circuit including output channels to which the data voltage is supplied and dummy output channels to which the common voltage is selectively supplied;

a channel selecting part for selectively supplying the common voltage to at least any one of the dummy output channels; and

a digital/analog converter located between the channel selecting part and the output circuit for converting the digital signal selected by the channel selecting part into an analog signal.

8. The liquid crystal display device according to claim 7, wherein the channel selecting part includes:

a selection signal receiving part to which a channel selection signal is supplied; and

first and second AND gates for selecting any one of a digital data for generating the data voltage and a digital common signal for generating the common voltage in accordance with a channel selection signal from the selection signal receiving part.

9. The liquid crystal display device according to claim 8, wherein the first and second AND gates are selectively driven in accordance with logic values which are contrary to each other.

10. The liquid crystal display device according to claim 7, wherein the liquid crystal display panel includes:

a thin film transistor array substrate and a color filter array substrate located to face each other with a liquid crystal therebetween,

wherein the common voltage supplied to the at least any one of the dummy output channels is supplied through a silver dot to a common electrode formed on the color filter array substrate.

11. A liquid crystal display device, comprising:

a liquid crystal display panel including a thin film transistor array substrate and a color filter array substrate sandwiching a liquid crystal therebetween;

a data drive circuit for supplying a data voltage to data lines of the liquid crystal display panel;

a gate drive circuit for supplying a gate signal to gate lines crossing the data lines of the liquid crystal display panel; and

a timing controller for providing control signals to the data and gate drive circuits so as to selectively drive thin film transistors included in the thin film transistor array substrate,

wherein the data drive circuit includes:

an output circuit having a first set of output channels for supplying the data voltage to the data lines and having a second set of output channels for supplying a common voltage to the color filter array substrate.

12. The liquid crystal display device according to claim 11, wherein the data drive circuit further includes:

a channel selecting part for selectively supplying the common voltage to at least any one of the second set of output channels.

13. The liquid crystal display device according to claim 12, wherein the channel selecting part includes:

a selection signal receiving part to which a channel selection signal is supplied; and

first and second AND gates for selecting any one of a digital data for generating the data voltage and a digital common signal for generating the common voltage in accordance with a channel selection signal from the selection signal receiving part.

14. The liquid crystal display device according to claim 13, wherein the first and second AND gates are selectively driven in accordance with logic values which are contrary to each other.

15. The liquid crystal display device according to claim 13, further comprising: a digital/analog converter located between the channel selecting part and the output circuit for converting the digital signal selected by the channel selecting part into an analog signal.

16. The liquid crystal display device according to claim 13, wherein the common voltage is supplied through a silver dot to a common electrode formed on the color filter array substrate.

* * * * *

专利名称(译)	玻璃型线上的液晶显示器		
公开(公告)号	US20060290646A1	公开(公告)日	2006-12-28
申请号	US11/475124	申请日	2006-06-27
[标]申请(专利权)人(译)	乐金显示有限公司		
申请(专利权)人(译)	LG.飞利浦液晶CO., LTD.		
当前申请(专利权)人(译)	LG DISPLAY CO., LTD.		
[标]发明人	KANG PIL SUNG		
发明人	KANG, PIL SUNG		
IPC分类号	G09G3/36		
CPC分类号	G02F1/1345 G09G2300/0426 G02F1/1362		
优先权	1020050056552 2005-06-28 KR		
其他公开文献	US7649579		
外部链接	Espacenet USPTO		

摘要(译)

一种玻璃上线型液晶显示装置，包括安装在液晶显示板上的栅极驱动集成电路，用于向液晶显示板提供栅极信号，以及用于提供数据电压的数据驱动集成电路。液晶显示面板。此外，数据驱动集成电路包括输出电路和虚拟输出通道，输出电路具有提供数据电压的有效输出通道，虚拟输出通道至少提供数据电压和公共电压中的任何一个。还包括通道选择部分，用于有选择地将数据电压和公共电压中的任何一个提供给虚拟输出通道中的至少任何一个。

