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(54) ARRAY SUBSTRATE AND LIQUID CRYSTAL DISPLAY DEVICE

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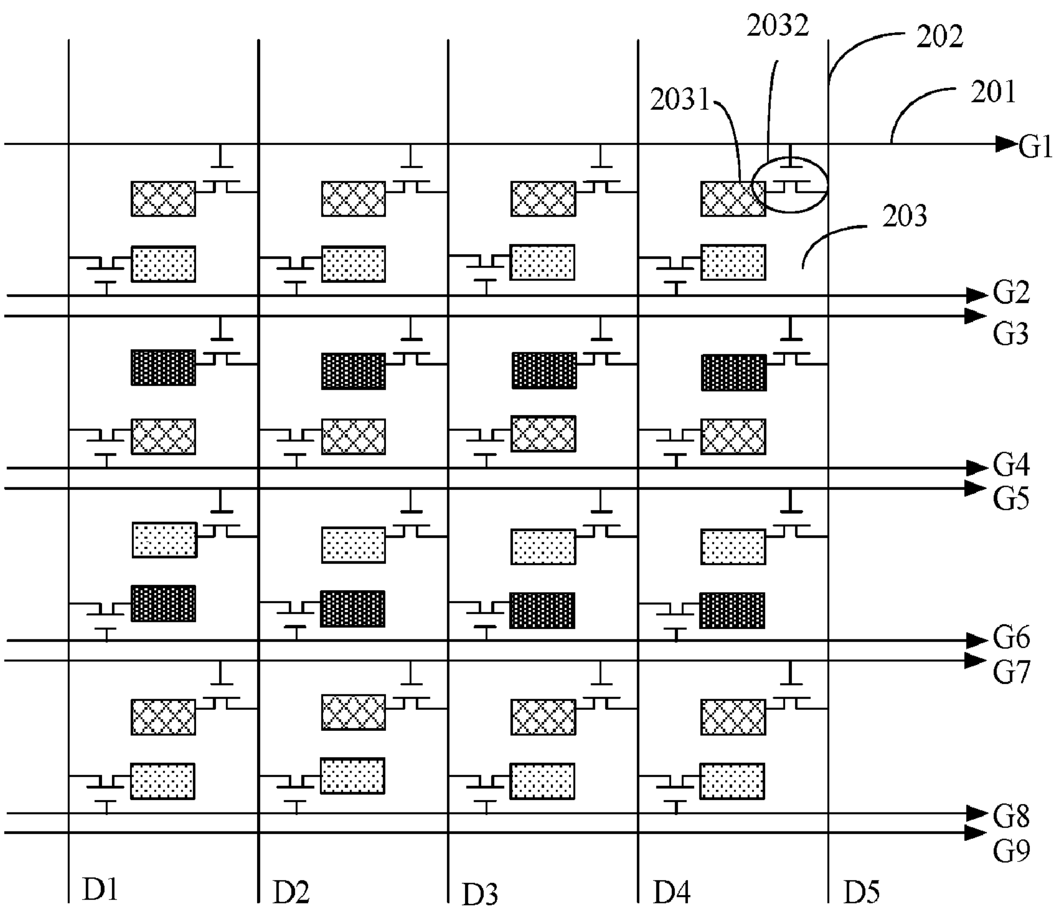
(57) **ABSTRACT**

The present invention propose an array substrate and a liquid crystal display device. The array substrate includes data lines and scan lines and a plurality of red, green and blue sub-pixels. The data lines and scan lines run across but not touching each other. The red, green and blue sub-pixels are lined in parallel along the data lines. Each sub-pixel connects corresponding scan line and data line via a thin film transistor. Each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different. The two neighboring sub-pixels have opposite polarity, and sub-pixels lined horizontally along the scan lines is of the same color. The present invention requires the fewer number of data lines, saving the cost of the array substrate. The present invention also saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio.



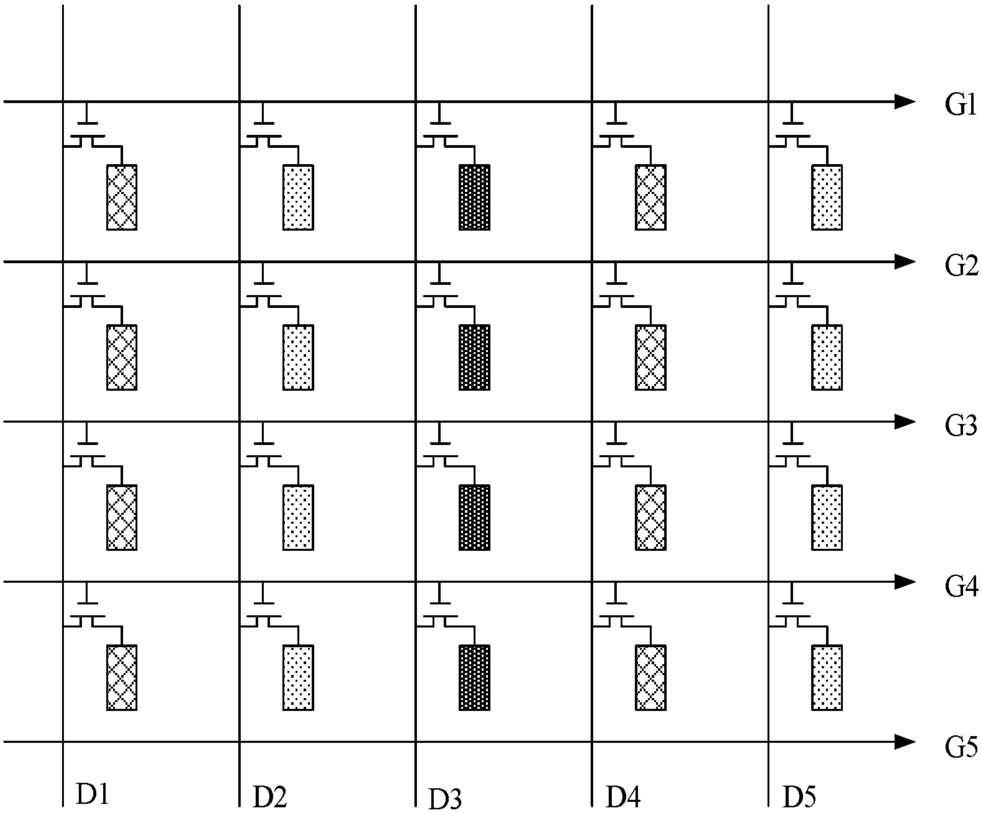



Fig. 1 (Prior art)

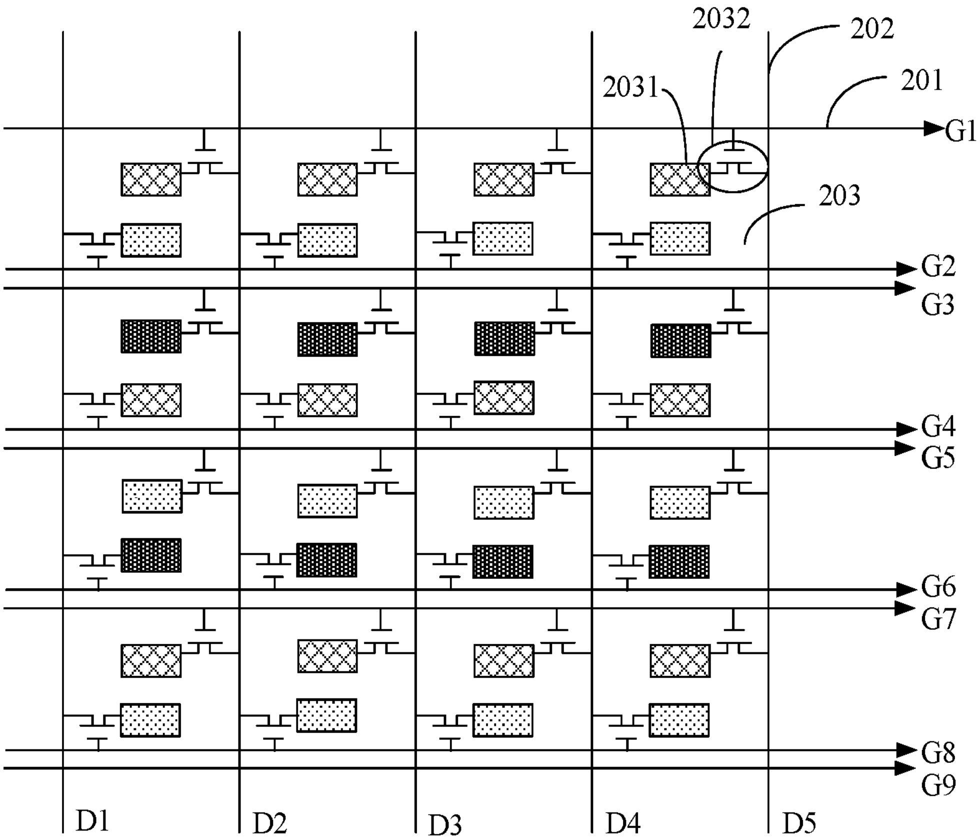



Fig. 2

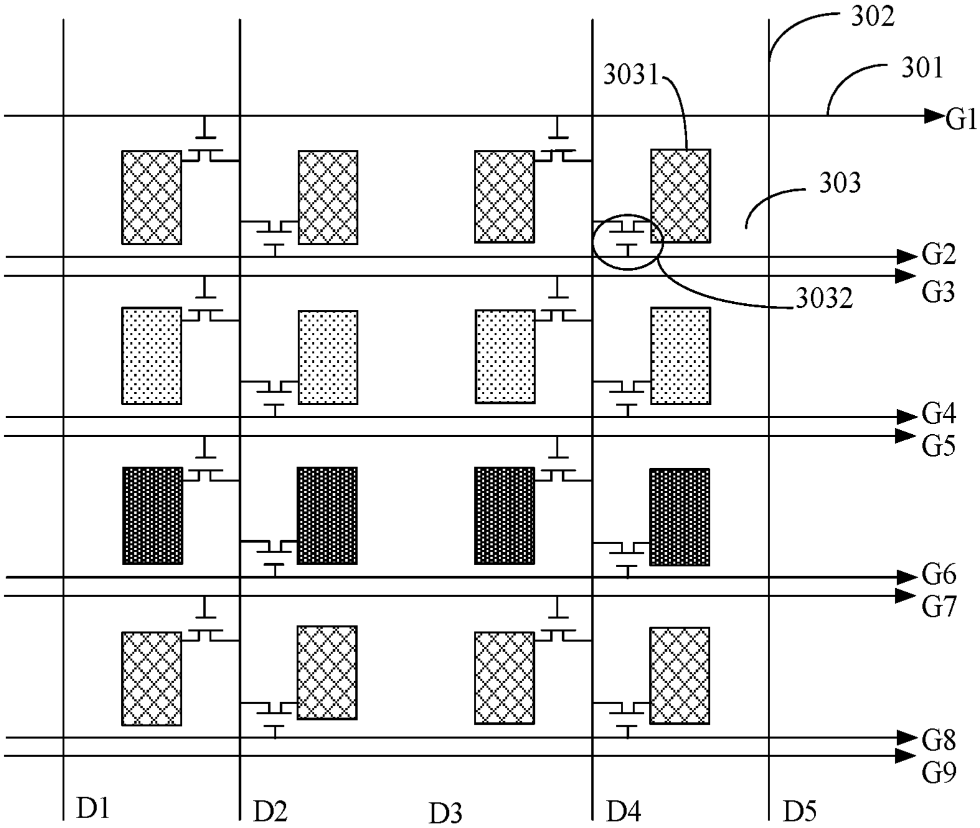

302
301
3031
G1
303
G2
G3
3032
G4
G5
G6
G7
G8
G9
D1
D2
D3
D4
D5

Fig. 3

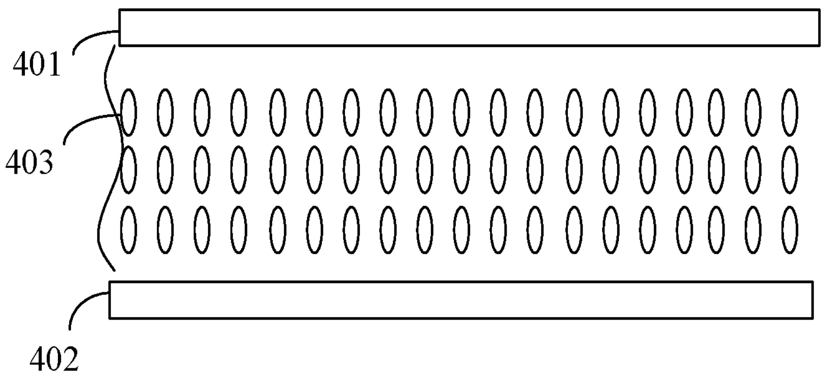

401
403
402

Fig. 4

# ARRAY SUBSTRATE AND LIQUID CRYSTAL DISPLAY DEVICE

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

**[0001]** The present invention relates to the field of liquid crystal display (LCD), and more specifically, to an array substrate and LCD device.

### 2. Description of the Prior Art

**[0002]** In the field of display technology, flat-panel display device such as LCD and organic light emitting diode (OLED) has gradually replaced cathode ray tube (CRT) display device and been applied extensively to LCD TVs, mobile phones, personal digital assistants (PDA), digital cameras, computer screens and notebook screens. An important component of LCDs or OLEDs is a display panel.

**[0003]** Be it a display panel of LCD or OLED, a display panel usually has a thin film transistor (TFT) array substrate. The TFT array substrate is formed with a plurality of red (R), green (G) and blue (B) sub-pixels arranged in arrays, and a plurality of scan lines and data lines. Each sub-pixel receives scan signals and data signals via its respective scan line and data line, so to display images.

**[0004]** Please refer to FIG. **1**. FIG. **1** is a structure diagram of an array substrate formed by conventional technology. The array substrate comprises a plurality of data lines, vertically arranged and parallel to each other, such as D**1**, D**2**, D**3**, D**4** and D**5** in FIG. **1**; a plurality of scan lines, horizontally arranged and parallel to each other, such as G**1**, G**2**, G**3**, and G**4** in FIG. **1**; and sub-pixels arranged in arrays. Each sub-pixel in the same row is electrically connected to a scan line above the row through a TFT. For example, each sub-pixel in the first row are electrically connected to scan line G**1** via a TFT, each sub-pixel in the second row are electrically connected to scan line G**2** via a TFT, and so on and so forth. Each sub-pixel in the same column is electrically connected to a data line in the left of the column through a TFT. For example, each sub-pixel in the first column is electrically connected to data line D**1** via a TFT, each sub-pixel in the second column are electrically connected to data line D**2** via a TFT, and so on and so forth.

**[0005]** However, the regular connection method mentioned above requires a large layout room on the array substrate, occupies areas covered by a photoshield, and lowers the aperture ratio of the display device. With the method, the utilization rate of data lines and scan lines are low. It wastes resources and increases the production cost of the display device.

## SUMMARY OF THE INVENTION

**[0006]** An object of the present invention is to provide an array substrate and LCD device, which not only lowers the number of data lines and production cost, but also saves the layout room and further reduces the area covered by a photoshield and improves the aperture ratio of pixels.

**[0007]** According to the present invention, an array substrate comprises a plurality of data lines and scan lines and a plurality of red (R), green (G) and blue (B) sub-pixels . The plurality of data lines and scan lines run across but not touching each other. The plurality of red (R), green (G) and blue (B) sub-pixels are lined in parallel along the data lines. Each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT). Each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different. The two neighboring sub-pixels have opposite polarity, and sub-pixels lined horizontally along the scan lines is of the same color.

**[0008]** Furthermore, each pixel area is installed with two sub-pixels lined in parallel along data lines, and each sub-pixel is connected to its corresponding scan line and data line via its corresponding TFT; two neighboring sub-pixels lined in parallel along the scan lines connect to different data lines.

**[0009]** Furthermore, the data lines are used to output column inversiondriving data or row inversiondriving data.

**[0010]** Furthermore, a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**[0011]** According to the present invention, an array substrate comprises a plurality of data lines and scan lines and a plurality of red (R), green (G) and blue (B) sub-pixels . The plurality of data lines and scan lines run across but not touching each other. The plurality of red (R), green (G) and blue (B) sub-pixels are lined in parallel along the data lines. Each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT). Each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different.

**[0012]** Furthermore, each pixel area is installed with two sub-pixels lined in parallel along data lines, and each sub-pixel is connected to its corresponding scan line and data line via its corresponding TFT; two neighboring sub-pixels lined in parallel along the scan lines connect to different data lines.

**[0013]** Furthermore, the data lines are used to output column inversiondriving data or row inversiondriving data.

**[0014]** Furthermore, a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**[0015]** Furthermore, the two neighboring sub-pixels have opposite polarity.

**[0016]** Furthermore, sub-pixels lined horizontally along the scan lines is of the same color.

**[0017]** Furthermore, the TFT comprises a drain electrically connected to the sub-pixels, a gate electrically connected to the scan lines, and a source electrically connected to the data lines.

**[0018]** According to the present invention, a liquid crystal display (LCD) device, comprises an array substrate, a color film substrate disposed opposite to the array substrate, and liquid crystal molecules sandwiched between the array substrate and color film substrate. The array substrate comprises a plurality of data lines and scan lines and a plurality of red (R), green (G) and blue (B) sub-pixels . The plurality of data lines and scan lines run across but not touching each other.

The plurality of red (R), green (G) and blue (B) sub-pixels are lined in parallel along the data lines. Each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT). Each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different.

**[0019]** Furthermore, the data lines are used to output column inversiondriving data or row inversiondriving data.

**[0020]** Furthermore, a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**[0021]** Furthermore, the two neighboring sub-pixels have opposite polarity.

**[0022]** Furthermore, sub-pixels lined horizontally along the scan lines is of the same color.

**[0023]** Furthermore, the TFT comprises a drain electrically connected to the sub-pixels, a gate electrically connected to the scan lines, and a source electrically connected to the data lines.

**[0024]** Different from conventional technology, a plurality of data lines and a plurality of scan lines of an array substrate of a present embodiment run across but do not touch each other, and form pixel areas. The present embodiment further comprises a plurality of RGB sub-pixels lined in parallel along the data lines. Comparing with the conventional technology with which RGB sub-pixels lined along the scan lines, the present embodiment requires only one-third of the number of data lines, saving the cost of two-thirds of the data lines, and therefore significantly reduces the cost of the array substrate. Each sub-pixel connects to its corresponding scan line and data line through a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines that form two neighboring pixel areas are different. It means that at least two scan lines are deployed between any two neighboring pixel areas lined along a data line. It saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0025]** FIG. **1** shows a structure diagram of a conventional array substrate.

**[0026]** FIG. **2** is a structure diagram of an array substrate according to a preferred embodiment of the present invention.

**[0027]** FIG. **3** is a structure diagram of an array substrate according to another preferred embodiment of the present invention.

**[0028]** FIG. **4** is a structure diagram of a liquid crystal display device according to a preferred embodiment of the present invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

**[0029]** An array substrate of a present embodiment comprises a plurality of data lines and a plurality of scan lines, which run across but do not touch each other, and form a plurality of pixel areas. In a preferred embodiment, all data lines are in parallel and all scan lines are in parallel, whereas data lines and scan lines are perpendicular to each other. No limitation as such is applied to the present embodiment. Furthermore, the array substrate comprises a plurality of RGB sub-pixels lined in parallel with data lines. Each sub-pixel electrically connects its corresponding scan line and data line via a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines forming any two neighboring pixel areas are not the same.

**[0030]** Please refer to FIG. **2** for specific description. FIG. **2** is a structure diagram of the array substrate of an embodiment of the present invention. In the present embodiment, scan lines **201** and data lines **202** run across but do not touch each other, forming a plurality of pixel areas **203**. A plurality of RGB sub-pixels **2031** lines along the data line **202**. Sub-pixels **2031** that lined horizontally along a scan line **201** are of the same color. Two neighboring sub-pixels **2031** are of opposite polarity. Comparing with conventional technology which arranges sub-pixels along scan lines, the present embodiment requires only one-third of the number of data lines as RGB sub-pixels line along data lines **202**. Although it means that the number of scan lines **201** must increase accordingly, chip on film (COF) on the side of the scan lines **201** is a lot cheaper than COF on the side of the data lines **202**. In addition, in other embodiments, scan lines **201** can even installed on the substrate directly without COF. Therefore, RGB sub-pixels **2031** lining along data lines **202** can significantly reduce the cost of the array substrate.

**[0031]** As shown in FIG. **2**, scan lines **201** forming two neighboring pixel areas **203** are different, meaning that the two neighboring pixel areas **203** lined along the data line **202** do not share a same scan line **201**. At least two scan lines **201** are deployed between any two neighboring pixel areas **203** lined along the data line **202**. The arrangement saves deployment space on the array substrate, reduces non-transparent areas and increases the aperture ratio.

**[0032]** Each pixel area **203** is installed with two sub-pixels **2031** lined in parallel with a data line. Each sub-pixel **2031** connects its respective scan line **201** and data line **202** via its respective TFT **2032**. The TFT **2032** comprises a drain electrically connected to the sub-pixel **2031**, a gate electrically connected to the scan line **201**, and a source electrically connected to the data line **202**. In a preferred embodiment, each sub-pixel **2031** connects the scan line **201** and data line **202** that are closest to it. For example, two scan lines **201** are deployed between two neighboring pixel areas **203** in the present embodiment. The sub-pixels **2031** deployed opposite to each other across the two scan lines **201** connect the one closest to themselves respectively. In addition, neighboring sub-pixels **2031** lined in parallel with the scan line **201** connect different data lines **202**. For example, assume that there are two sub-pixels **2031** lined in parallel with the data line **202**, with data lines arranged horizontally and scan lines vertically, as shown in FIG. **2**. The sub-pixel **2031** on the upper part connects the data line **202** on the right of the pixel area **203**, and the sub-pixel **2031** on the lower part connects the data line **202** on the left of the pixel area **203**. It means that sub-pixels **2031** in odd rows and sub-pixels **2031** in even rows line alternately. When sub-pixels **2031** are arranged in arrays, sub-pixels **2031** of the same order number in the neighboring rows connect two neighboring data lines **202** respectively. Neighboring data lines provide different voltages, and when data lines **202** output column inversion data, dot inversion can be realized. The method not only saves the tremendous energy consumed by dot inversion, lowers the cost of the array substrate, and delivers good display effect brought by dot inversion, enhancing display quality.

**[0033]** The horizontal deployment of scan lines **201** and vertical deployment of data lines **202** are relative. When the direction of the array substrate changes, the positions of scan lines **201** and data lines **202** change accordingly. Therefore, when the position of the array substrate turns 90 degrees or the viewing angle of users turns 90 degrees, the horizontal and vertical deployment switches accordingly. The column inversion becomes a row inversion, but its nature or effect does not change. No limitation as such is imposed here.

**[0034]** Different from conventional technology, a plurality of data lines and a plurality of scan lines of an array substrate of a present embodiment run across but do not touch each other, and form pixel areas. The present embodiment further comprises a plurality of RGB sub-pixels lined in parallel along the data lines. Comparing with the conventional technology with which RGB sub-pixels lined along the scan lines, the present embodiment requires only one-third of the number of data lines, saving the cost of two-thirds of the data lines, and therefore significantly reduces the cost of the array substrate. Each sub-pixel connects to its corresponding scan line and data line through a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines that form two neighboring pixel areas are different. It means that at least two scan lines are deployed between any two neighboring pixel areas lined along a data line. It saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio. In addition, the two sub-pixels lined in parallel along a data line in each pixel area connect to their corresponding scan lines and data lines via their corresponding TFTs respectively. The two neighboring sub-pixels lined in parallel along a scan line connect to different data lines, with neighboring data lines providing different voltages. When data lines output column inversion data, dot inversion can be realized. It not only saves the tremendous energy consumed by dot inversion, lowers the cost of the array substrate, but also delivers good display effect brought by dot inversion, enhancing display quality.

**[0035]** Please refer to FIG. **3**. FIG. **3** is a structure diagram of an array substrate of another embodiment of the present invention. The scan lines **301** and data lines **302** of the array substrate of the present embodiment run across but do not touch each other, forming a plurality of pixel areas **303**. A plurality of sub-pixels RGB **3031** line along the data line **302**. Sub-pixels **3031** lined horizontally along the scan line **301** are of the same color, and two neighboring sub-pixels **3031** are of opposite polarity. Comparing with conventional technology which arranges RGB sub-pixels along data lines **302**, the present embodiment requires only one-third of the number of data lines as RGB sub-pixels line along scan lines. Although it means that the number of scan lines **301** must increase accordingly, COF on the side of the scan lines **301** is a lot cheaper than COF on the side of the data lines **302**. In addition, in other embodiments, scan lines **301** can even installed on the substrate directly without COF. Therefore, RGB sub-pixels **3031** lining along data lines **302** can significantly reduce the cost of the array substrate.

**[0036]** As shown in FIG. **3**, scan lines **301** forming two pixel areas **303** are different, meaning that the two neighboring pixel areas **303** lined along the data line **302** do not share a same scan line **301**. At least two scan lines **301** are deployed between any two neighboring pixel areas **303** lined along the data line **302**. The arrangement saves deployment space on the array substrate, reduces non-transparent areas and increases the aperture ratio.

**[0037]** In the present embodiment, scan lines **301** line horizontally and data lines **302** line vertically. A sub-pixel **3031** is installed in the pixel area **303** situated in odd rows on the array substrate. Two sub-pixels **3031** are installed in parallel along scan lines **301** in the pixel area **303** situated in even rows on the array substrate. Each sub-pixel **3031** connects its corresponding scan line via its respective TFT **3032**. The TFT **3032** comprises a drain electrically connected to the sub-pixel **3031**, a gate electrically connected to the scan line **301**, and a source electrically connected to the data line **302**. In addition, two neighboring sub-pixels **3031** lined in parallel along the scan line **301** connect to different scan lines **301**. For example, two scan lines **301** are deployed between two pixel areas **303** lined along two data lines **302**. Sub-pixels **3031** in odd rows and sub-pixels **3032** in even rows deployed opposite to each other across the two scan lines **301** connect to the scan line that is closet to them respectively.

**[0038]** The two neighboring sub-pixels **3031** that are opposite to each other across the data line **302** connect to the same data line **302**. Comparing with conventional technology that connects each sub-pixel in a row to a different data line, the present embodiment saves half of the data lines. It means that comparing with conventional technology shown in FIG. **1**, the array substrate of the present embodiment only requires one-sixth of the data lines, saving five-sixths of the data lines and significantly reduces the production cost of the array substrate.

**[0039]** Different from conventional technology, a plurality of data lines and a plurality of scan lines of an array substrate of a present embodiment run across but do not touch each other, and form pixel areas. The present embodiment further comprises a plurality of RGB sub-pixels lined in parallel along the data lines. Comparing with the conventional technology with which RGB sub-pixels lined along the scan lines, the present embodiment requires only one-third of the number of data lines, saving the cost of two-thirds of the data lines, and therefore significantly reduces the cost of the array substrate. Each sub-pixel connects to its corresponding scan line and data line through a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines that form two neighboring pixel areas are different. It means that at least two scan lines are deployed between any two neighboring pixel areas lined along a data line. It saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio. Moreover, the cost of the array substrate can be lowered even more, as the number of data lines can be further halved when two neighboring pixel areas opposite to each other across a data line connect the same data line.

**[0040]** Please refer to FIG. **4**. FIG. **4** is a structure diagram of an embodiment of a LCD device of the present invention. The LCD device of the present embodiment comprises an array substrate **401**, a color film substrate **402**, and liquid crystal molecules **403** that are sandwiched between the array substrate and the color film substrate. The array substrate comprises a plurality of data lines and scan lines. The data lines and scan lines run across but do not touch each other, forming a plurality of pixel areas. In a preferred embodiment, all data lines are in parallel and all scan lines are in parallel, whereas data lines and scan lines are perpendicular to each other. No such limitation is applied in the present embodiment. Furthermore, the array substrate comprises a plurality of RGB sub-pixels. The RGB pixels line in parallel with data lines, and each RGB pixel electrically connects its corresponding scan line and data line via a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines forming two neighboring pixel areas are not the same.

**[0041]** In one of the embodiments, two sub-pixels lined in parallel along the data lines are installed in each pixel area. Each sub-pixel connects its corresponding scan line and data line via its corresponding TFT respectively. Two neighboring sub-pixels lined in parallel along scan lines connect to different data lines. No such limitation is imposed here. Please refer to FIG. **2** and corresponding description for specifics.

**[0042]** Different from conventional technology, a plurality of data lines and a plurality of scan lines of an array substrate of a present embodiment run across but do not touch each other, and form pixel areas. The present embodiment further comprises a plurality of RGB sub-pixels lined in parallel along the data lines. Comparing with the conventional technology with which RGB sub-pixels lined along the scan lines, the present embodiment requires only one-third of the number of data lines, saving the cost of two-thirds of the data lines, and therefore significantly reduces the cost of the array substrate. Each sub-pixel connects to its corresponding scan line and data line through a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines that form two neighboring pixel areas are different. It means that at least two scan lines are deployed between any two neighboring pixel areas lined along a data line. It saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio. In addition, the two sub-pixels lined in parallel along a data line in each pixel area connect to their corresponding scan lines and data lines via their corresponding TFTs respectively. The two neighboring sub-pixels lined in parallel along a scan line connect to different data lines, with neighboring data lines providing different voltages. When data lines output column inversion data, dot inversion can be realized. It not only saves the tremendous energy consumed by dot inversion, lowers the cost of the array substrate, but also delivers good display effect brought by dot inversion, enhancing display quality.

**[0043]** In another embodiment, a sub-pixel is installed in pixel areas of odd rows, and two sub-pixels lined in parallel along the scan line are installed in the pixel areas of even rows. Each sub-pixel connects its corresponding scan line and data line via its corresponding TFT respectively. Two neighboring sub-pixels lined in parallel along the scan line connect to different scan lines. Two neighboring sub-pixels situated opposite across a data line connect to the same data line. No further explanation is provided here. Please refer to FIG. **3** and corresponding description for more specifics.

**[0044]** Different from conventional technology, a plurality of data lines and a plurality of scan lines of an array substrate of a present embodiment run across but do not touch each other, and form pixel areas. The present embodiment further comprises a plurality of RGB sub-pixels lined in parallel along the data lines. Comparing with the conventional technology with which RGB sub-pixels lined along the scan lines, the present embodiment requires only one-third of the number of data lines, saving the cost of two-thirds of the data lines, and therefore significantly reduces the cost of the array substrate. Each sub-pixel connects to its corresponding scan line and data line through a TFT. Each pixel area is installed with at least one sub-pixel, and the scan lines that form two neighboring pixel areas are different. It means that at least two scan lines are deployed between any two neighboring pixel areas lined along a data line. It saves the layout room on the array substrate, reduces non-transparent areas, and increases aperture ratio. Moreover, the cost of the array substrate can be lowered even more, as the number of data lines can be further halved when two neighboring pixel areas opposite to each other across a data line connect the same data line.

**[0045]** The present disclosure is described in detail in accordance with the above contents with the specific preferred examples. However, this present disclosure is not limited to the specific examples. For the ordinary technical personnel of the technical field of the present disclosure, on the premise of keeping the conception of the present disclosure, the technical personnel can also make simple deductions or replacements, and all of which should be considered to belong to the protection scope of the present disclosure.

What is claimed is:

**1**. An array substrate, comprising:

a plurality of data lines and scan lines, running across but not touching each other; and

a plurality of red (R), green (G) and blue (B) sub-pixels, lined in parallel along the data lines; each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT); each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different,

wherein the two neighboring sub-pixels have opposite polarity, and sub-pixels lined horizontally along the scan lines is of the same color.

**2**. The array substrate of claim **1**, wherein each pixel area is installed with two sub-pixels lined in parallel along data lines, and each sub-pixel is connected to its corresponding scan line and data line via its corresponding TFT; two neighboring sub-pixels lined in parallel along the scan lines connect to different data lines.

**3**. The array substrate of claim **2**, wherein the data lines are used to output column inversiondriving data or row inversiondriving data.

**4**. The array substrate of claim **1**, wherein a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**5**. An array substrate, comprising:

a plurality of data lines and scan lines, running across but not touching each other; and

a plurality of red (R), green (G) and blue (B) sub-pixels, lined in parallel along the data lines; each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT); each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different.

**6**. The array substrate of claim **5**, wherein each pixel area is installed with two sub-pixels lined in parallel along data lines, and each sub-pixel is connected to its corresponding scan line and data line via its corresponding TFT; two neighboring sub-pixels lined in parallel along the scan lines connect to different data lines.

**7**. The array substrate of claim **6**, wherein the data lines are used to output column inversiondriving data or row inversiondriving data.

**8**. The array substrate of claim **5**, wherein a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**9**. The array substrate of claim **5**, wherein the two neighboring sub-pixels have opposite polarity.

**10**. The array substrate of claim **5**, wherein sub-pixels lined horizontally along the scan lines is of the same color.

**11**. The array substrate of claim **5**, wherein the TFT comprises a drain electrically connected to the sub-pixels, a gate electrically connected to the scan lines, and a source electrically connected to the data lines.

**12**. A liquid crystal display (LCD) device, comprising:

an array substrate;

a color film substrate, disposed opposite to each other; and

liquid crystal molecules sandwiched between the array substrate and color film substrate; wherein the array substrate comprises:

a plurality of data lines and scan lines, running across but not touching each other;

a plurality of red (R), green (G) and blue (B) sub-pixels, lined in parallel along the data lines; each sub-pixel connects corresponding scan line and data line via a thin film transistor (TFT); each pixel area is installed with at least one sub-pixel, and scan lines forming two neighboring pixel areas are different.

**13**. The LCD device of claim **12**, wherein each pixel area is installed with two sub-pixels lined in parallel along data lines, and each sub-pixel is connected to its corresponding scan line and data line via its corresponding TFT; two neighboring sub-pixels lined in parallel along the scan lines connect to different data lines.

**14**. The LCD device of claim **13**, wherein the data lines are used to output column inversiondriving data or row inversiondriving data.

**15**. The LCD device of claim **12**, wherein a sub-pixel is installed in the pixel areas in odd rows and two sub-pixels lined in parallel along the scan lines are installed in the pixel areas in even rows, with each sub-pixel connected to its corresponding scan line via its corresponding TFT; two neighboring sub-pixels lined in parallel along scan lines connect to different scan lines, and two neighboring sub-pixels opposite to each other across the data line connect the same data line.

**16**. The LCD device of claim **12**, wherein the two neighboring sub-pixels have opposite polarity.

**17**. The LCD device of claim **12**, wherein sub-pixels lined horizontally along the scan lines is of the same color.

**18**. The LCD device of claim **12**, wherein the TFT comprises a drain electrically connected to the sub-pixels, a gate electrically connected to the scan lines, and a source electrically connected to the data lines.

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摘要(译)

本发明提出一种阵列基板和液晶显示装置。阵列基板包括数据线和扫描线以及多个红色，绿色和蓝色子像素。数据线和扫描线交叉但不相互接触。红色，绿色和蓝色子像素沿数据线平行排列。每个子像素通过薄膜晶体管连接相应的扫描线和数据线。每个像素区域安装有至少一个子像素，并且形成两个相邻像素区域的扫描线是不同的。两个相邻的子像素具有相反的极性，并且沿扫描线水平排列的子像素具有相同的颜色。本发明需要较少数量的数据线，节省了阵列基板的成本。本发明还节省了阵列基板上的布局空间，减少了不透明区域，并增加了开口率。