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(54) **ARRAY SUBSTRATE AND LIQUID CRYSTAL DISPLAY**

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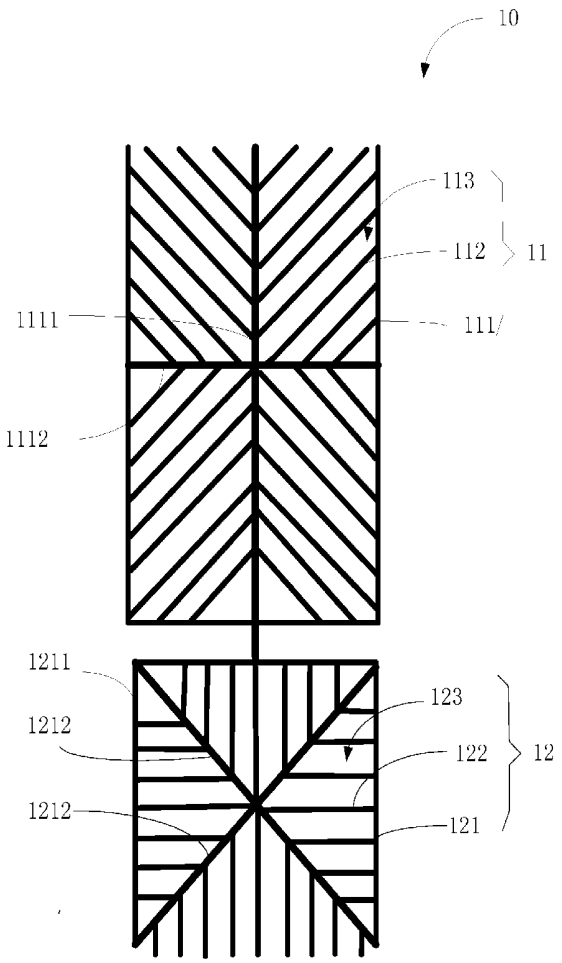
(57) **ABSTRACT**

The present invention provides an array substrate, comprising a plurality of pixel electrodes arranged in array, and each pixel electrode comprises a first pixel region and a second pixel region connected to the first pixel region, and the first electrode region comprises a first peripheral electrode and four first sub regions, each having a plurality of first branch electrodes, and the first branch electrodes are obliquely disposed and have an angle to the first peripheral electrode; the second pixel region comprises a second peripheral electrode and four second sub regions, each having a plurality of second branch electrodes, and in the four second sub regions, the second branch electrodes in two second sub regions are arranged horizontally, and the second branch electrodes in the other two second sub regions are arranged vertically.



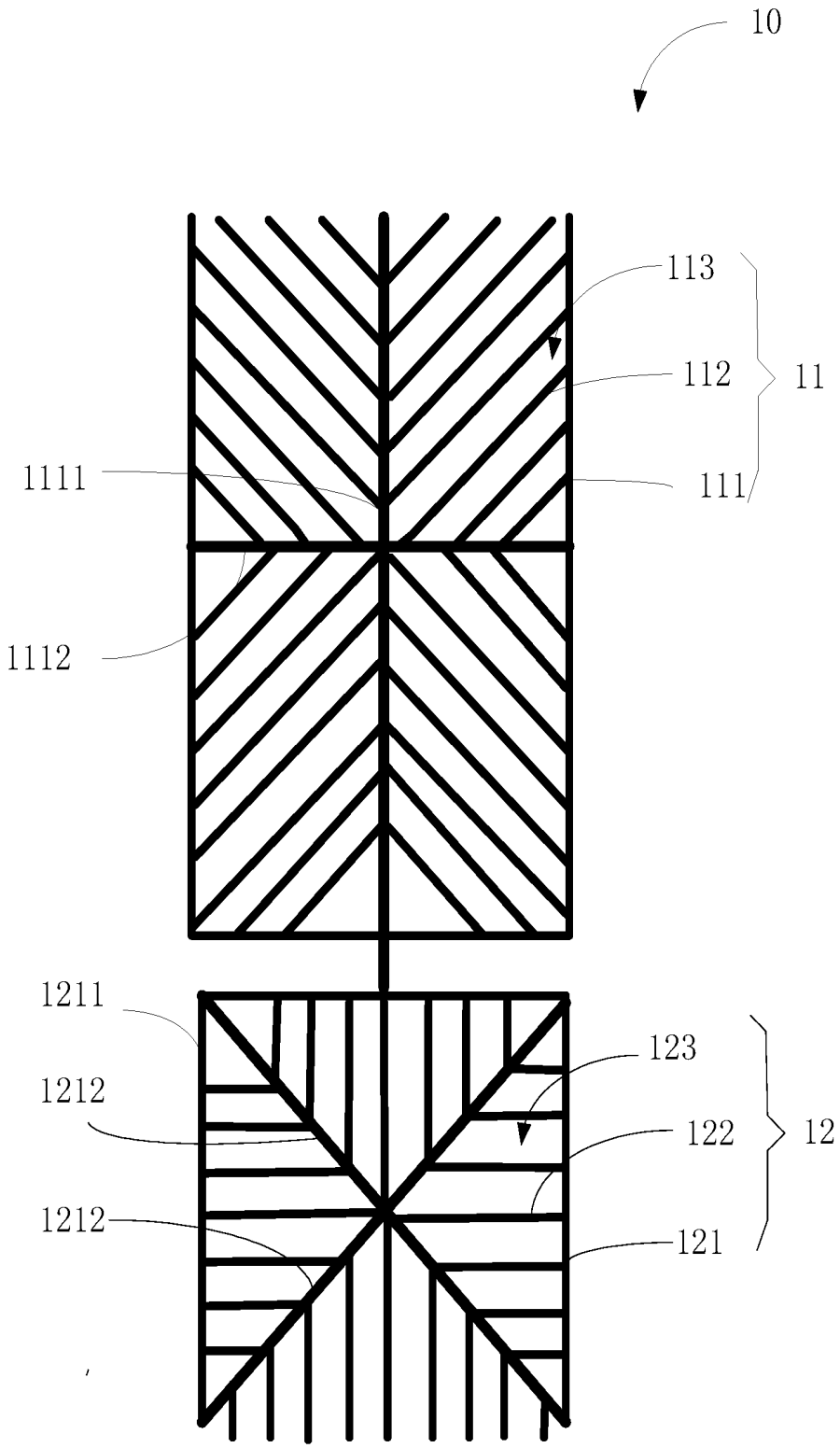


FIG. 1

ARRAY SUBSTRATE AND LIQUID CRYSTAL DISPLAY

CROSS REFERENCE

[0001] This application claims the priority of Chinese Patent Application No. 201710211319.2, entitled "Array substrate and liquid crystal display", filed on Mar. 31, 2017, the disclosure of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to a touch panel technology field, and more particularly to an array substrate and a liquid crystal display.

BACKGROUND OF THE INVENTION

[0003] The common large size Liquid crystal display panel uses the design of 4 pixel domains. The sub electrodes are arranged at an angle of 45 degrees to the vertical direction. Such arrangement of pixel electrodes causes the liquid crystal to be aligned at an oblique angle of 45 degrees, and such arrangement of the liquid crystal will make the brightness of the oblique direction and the brightness of horizontal/vertical direction are inconsistent to result in the differences in the viewing angle, and the more obvious brightness difference among various angles.

SUMMARY OF THE INVENTION

[0004] The present invention provides an array substrate and a liquid crystal display which can reduce difference in viewing angle brightness.

[0005] The array substrate of the present application comprises a plurality of pixel electrodes arranged in array, and each pixel electrode comprises a first pixel region and a second pixel region connected to the first pixel region, and the first electrode region comprises a first peripheral electrode and four first sub regions, each having a plurality of first branch electrodes, and the first branch electrodes are obliquely disposed and have an angle to the first peripheral electrode; the second pixel region comprises a second peripheral electrode and four second sub regions, each having a plurality of second branch electrodes, and in the four second sub regions, the second branch electrodes in two second sub regions are arranged horizontally, and the second branch electrodes in the other two second sub regions are arranged vertically.

[0006] The second peripheral electrode comprises two main electrodes, and the two main electrodes are arranged on two diagonal lines of the second peripheral electrode and are orthogonally crossed, and the two main electrodes and the second peripheral electrode form the four second sub regions, and the second branch electrodes in each second sub region are perpendicular to the second peripheral electrode, which constitute the second sub region.

[0007] The first electrode region comprises a vertical main electrode and a horizontal main electrode, which are orthogonally crossed in the first peripheral electrode, and the vertical main electrode and the horizontal main electrode are crossed to form the four first sub regions, and the first branch electrodes are distributed in each of the first sub regions and have an angle to the vertical main electrode or the horizontal main electrode.

[0008] The vertical main electrode extends to an outside of the first peripheral electrode and is connected to the second peripheral electrode.

[0009] The first electrode region and the second electrode region are connected by a peripheral trace.

[0010] The first branch electrodes are set at an angle of ±45 degrees or ±135 degrees with the horizontal main electrode or the vertical main electrode; the second branch electrodes are set at ±45 degrees with the two main electrodes.

[0011] The first peripheral electrode and the second peripheral electrode are rectangular frame structures.

[0012] Gaps among the plurality of second branch electrodes in each of the second sub regions are different from gaps among the plurality of first branch electrodes in each of the first sub regions.

[0013] A width of the first branch electrodes is different from a width of the second branch electrodes.

[0014] The liquid crystal display provided by the present invention comprises the array substrate, a color film substrate and a liquid crystal layer sandwiched between the array substrate and the color film substrate.

[0015] The pixel electrodes of the array substrate of the present application are provided with two different arrangements of electrode regions, which can reduce the brightness difference and improve the color shift phenomenon.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The structural features and effects of the present invention will be more clearly described, which will now be described in detail with reference to the accompanying drawings and specific embodiments.

[0017] FIG. **1** is a top view diagram of a pixel electrode of an array substrate according to the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0018] For better explaining the technical solution and the effect of the present invention, the present invention will be further described in detail with the accompanying drawings in the specific embodiments. The figures are for illustrative purposes only and are illustrative only but not to be construed as limiting the present application.

[0019] The present invention provides a liquid crystal display and an array substrate. The liquid crystal display comprises the array substrate, a color film substrate and a liquid crystal layer sandwiched between the array substrate and the color film substrate. Please refer to FIG. **1**. The array substrate provided by the present invention comprises a plurality of pixel electrodes **10** arranged in array. The plurality of pixel electrodes **10** are located on a substrate of the array substrate and connected to source lines. Each pixel electrode **10** comprises a first pixel region **11** and a second pixel region **12** connected to the first pixel region **11**, and the first electrode region **11** comprises a first peripheral electrode **111** and four first sub regions **113**, each having a plurality of first branch electrodes **112**, and the first branch electrodes **112** are obliquely disposed and have an angle to the first peripheral electrode **111**. The second pixel region **12** comprises a second peripheral electrode **121** and four second sub regions **123**, each having a plurality of second branch electrodes **122**, and in the four second sub regions **123**, the second branch electrodes **122** in two second sub regions **123**

are arranged horizontally, and the second branch electrodes **122** in the other two second sub regions **123** are arranged vertically.

[0020] In this embodiment, the pixel electrode **10** is a rectangular structure. The first electrode region **11** and the second electrode region **12** are rectangular. As shown in the FIGURE, the first electrode region **11** is above the second electrode region **12**. The second peripheral electrode **121** is a rectangular frame structure and comprises a frame **1211** and two main electrodes **1212**. The two main electrodes **1212** are arranged on two diagonal lines of the second peripheral electrode **121** and are orthogonally crossed. The two main electrodes **1212** and the second peripheral electrode **121** form the four second sub regions **123**, and the second branch electrodes **122** in each second sub region **123** are perpendicular to the second peripheral electrode **121**, which constitute the second sub region. The second branch electrodes **122** in two second sub regions **123** which are opposite are arranged horizontally. Namely, the second branch electrodes **122** are perpendicular to the second peripheral electrode **121**, which constitute the second sub region **123**. In this embodiment, the second branch electrodes **122** are perpendicular to a vertical portion of the frame **1211** of the second peripheral electrode. Besides, the second branch electrodes **122** in the other two second sub regions **123** which are opposite are arranged vertically. Namely, the second branch electrodes **122** are perpendicular to the second peripheral electrode **121**, which constitute the second sub region **123**. In this embodiment, the second branch electrodes **122** are perpendicular to a horizontal portion of the frame **1211** of the second peripheral electrode. All the second branch electrodes **122** are arranged at an angle with the main electrode electrodes **1212**, which are set at ±45 degrees in this embodiment.

[0021] In this embodiment, the first electrode region **11** comprises a vertical main electrode **1111** and a horizontal main electrode **1112**, which are orthogonally crossed in the first peripheral electrode **111**, and the vertical main electrode **1111** and the horizontal main electrode **1112** are crossed to form the four first sub regions **113**, and the first branch electrodes **112** are distributed in each of the first sub regions **113** and have an angle to the vertical main electrode **1111** or the horizontal main electrode **1112**. The first branch electrodes **112** are set at an angle of ±45 degrees or ±135 degrees with the horizontal main electrode **1111** or the vertical main electrode **1112**.

[0022] Furthermore, the vertical main electrode **1111** extends to an outside of the first peripheral electrode **111** and is connected to the second peripheral electrode **121**. In other embodiments, the first electrode region **11** and the second electrode region **12** are connected by a peripheral trace. For instance, an extension line of the horizontal main electrode **1112** in the first peripheral electrode **111**, an extension line of the main electrode **1212** of the second peripheral electrode **121** or an external trace can be illustrated.

[0023] Furthermore, gaps among the plurality of second branch electrodes **122** in each of the second sub regions **123** are different from gaps among the plurality of first branch electrodes **112** in each of the first sub regions **113**. A width of the first branch electrodes **112** is different from a width of the second branch electrodes **122**. Thus, the twist angles of the liquid crystals will have difference to achieve low color shift function. Certainly, the gaps among the plurality of second branch electrodes **122** can be equal to the gaps among the plurality of first branch electrodes **112** according to design needs. A width of the first branch electrodes **112** is equal to a width of the second branch electrodes **122**.

[0024] In the array substrate of the present invention, each pixel electrode is divided into two parts. A portion of the branch electrodes are arranged horizontally and vertically so that the liquid crystal molecules in the pixels can be arranged more than the angle of 45 degrees but additionally with the vertical direction and horizontal direction. Accordingly, the liquid crystal molecule long axis can be seen in various angles to greatly increase the viewing angle.

[0025] Above are only specific embodiments of the present invention, the scope of the present invention is not limited to this, and to any persons who are skilled in the art, change or replacement which is easily derived should be covered by the protected scope of the invention. Thus, the protected scope of the invention should go by the subject claims.

What is claimed is:

1. An array substrate, comprising a plurality of pixel electrodes arranged in array, wherein each pixel electrode comprises a first pixel region and a second pixel region connected to the first pixel region, and the first electrode region comprises a first peripheral electrode and four first sub regions, each having a plurality of first branch electrodes, and the first branch electrodes are obliquely disposed and have an angle to the first peripheral electrode; the second pixel region comprises a second peripheral electrode and four second sub regions, each having a plurality of second branch electrodes, and in the four second sub regions, the second branch electrodes in two second sub regions are arranged horizontally, and the second branch electrodes in the other two second sub regions are arranged vertically.

2. The array substrate according to claim **1**, wherein the second peripheral electrode comprises two main electrodes, and the two main electrodes are arranged on two diagonal lines of the second peripheral electrode and are orthogonally crossed, and the two main electrodes and the second peripheral electrode form the four second sub regions, and the second branch electrodes in each second sub region are perpendicular to the second peripheral electrode, which constitute the second sub region.

3. The array substrate according to claim **2**, wherein the first electrode region comprises a vertical main electrode and a horizontal main electrode, which are orthogonally crossed in the first peripheral electrode, and the vertical main electrode and the horizontal main electrode are crossed to form the four first sub regions, and the first branch electrodes are distributed in each of the first sub regions and have an angle to the vertical main electrode or the horizontal main electrode.

4. The array substrate according to claim **3**, wherein the vertical main electrode extends to an outside of the first peripheral electrode and is connected to the second peripheral electrode of the second electrode region.

5. The array substrate according to claim **1**, wherein the first electrode region and the second electrode region are connected by a peripheral trace.

6. The array substrate according to claim **3**, wherein the first branch electrodes are set at an angle of ±45 degrees or ±135 degrees with the horizontal main electrode or the vertical main electrode; the second branch electrodes are set at ±45 degrees with the two main electrodes.

7. The array substrate according to claim 6, wherein the first peripheral electrode and the second peripheral electrode are rectangular frame structures.

8. The array substrate according to claim 1, wherein gaps among the plurality of second branch electrodes in each of the second sub regions are different from gaps among the plurality of first branch electrodes in each of the first sub regions.

9. The array substrate according to claim 1, wherein a width of the first branch electrodes is different from a width of the second branch electrodes.

10. A liquid crystal display, comprising an array substrate, a color filter substrate and a liquid crystal layer sandwiched between the array substrate and the color filter substrate, and the array substrate comprising a plurality of pixel electrodes arranged in array, wherein each pixel electrode comprises a first pixel region and a second pixel region connected to the first pixel region, and the first electrode region comprises a first peripheral electrode and four first sub regions, each having a plurality of first branch electrodes, and the first branch electrodes are obliquely disposed and have an angle to the first peripheral electrode; the second pixel region comprises a second peripheral electrode and four second sub regions, each having a plurality of second branch electrodes, and in the four second sub regions, the second branch electrodes in two second sub regions are arranged horizontally, and the second branch electrodes in the other two second sub regions are arranged vertically.

11. The liquid crystal display according to claim 10, wherein the second peripheral electrode comprises two main electrodes, and the two main electrodes are arranged on two diagonal lines of the second peripheral electrode and are orthogonally crossed, and the two main electrodes and the second peripheral electrode form the four second sub regions, and the second branch electrodes in each second sub region are perpendicular to the second peripheral electrode, which constitute the second sub region.

12. The liquid crystal display according to claim 11, wherein the first electrode region comprises a vertical main electrode and a horizontal main electrode, which are orthogonally crossed in the first peripheral electrode, and the vertical main electrode and the horizontal main electrode are crossed to form the four first sub regions, and the first branch electrodes are distributed in each of the first sub regions and have an angle to the vertical main electrode or the horizontal main electrode.

13. The liquid crystal display according to claim 12, wherein the vertical main electrode extends to an outside of the first peripheral electrode and is connected to the second peripheral electrode of the second electrode region.

14. The liquid crystal display according to claim 10, wherein the first electrode region and the second electrode region are connected by a peripheral trace.

15. The liquid crystal display according to claim 12, wherein the first branch electrodes are set at an angle of ±45 degrees or ±135 degrees with the horizontal main electrode or the vertical main electrode; the second branch electrodes are set at ±45 degrees with the two main electrodes.

16. The liquid crystal display according to claim 15, wherein the first peripheral electrode and the second peripheral electrode are rectangular frame structures.

17. The liquid crystal display according to claim 10, wherein gaps among the plurality of second branch electrodes in each of the second sub regions are different from gaps among the plurality of first branch electrodes in each of the first sub regions.

18. The liquid crystal display according to claim 10, wherein a width of the first branch electrodes is different from a width of the second branch electrodes.

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专利名称(译)	阵列基板和液晶显示器		
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摘要(译)

本发明提供一种阵列基板，包括排列成阵列的多个像素电极，每个像素电极包括第一像素区域和连接第一像素区域的第二像素区域，第一电极区域包括第一外围电极和四个第一子区域，每个具有多个第一分支电极，第一分支电极倾斜设置并与第一外围电极成角度;第二像素区域包括第二外围电极和四个第二子区域，每个第二子区域具有多个第二分支电极，并且在四个第二子区域中，两个第二子区域中的第二分支电极水平布置，第二分支电极在另外两个第二子区域中垂直排列。