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Suzuki et al.

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(54) **LIQUID CRYSTAL DISPLAY DEVICE**

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G02F 1/1368	(2006.01)
H01L 27/12	(2006.01)
G02F 1/1345	(2006.01)
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(58) **Field of Classification Search**

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See application file for complete search history.

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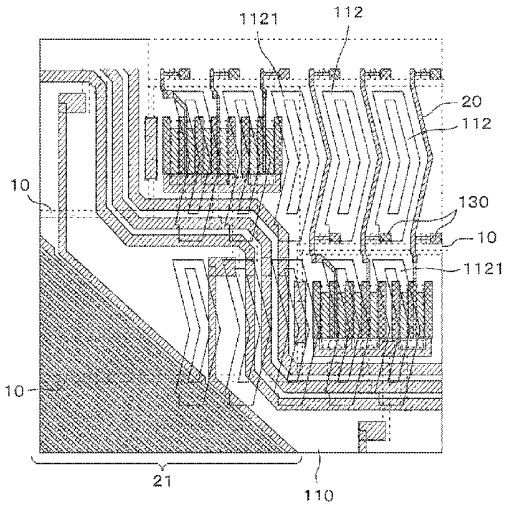
(57) **ABSTRACT**

A liquid crystal display device having an outer shape of a display region formed other than a rectangle. A driver for supplying a video signal is disposed outside the display region. A selector with selector TFT is disposed between the display region and the driver. A video signal line is disposed between the driver and the selector, and a drain line is disposed between the selector and the display region. A scanning circuit for supplying a scanning signal to the scanning line is disposed outside the display region. The selector is disposed between the scanning line and the display region, and covered with ITO as the common electrode. The common bus wiring is disposed outside the selector.

19 Claims, 8 Drawing Sheets



(51) **Int. Cl.**

G02F 1/1335	(2006.01)
G02F 1/1337	(2006.01)
G02F 1/1343	(2006.01)

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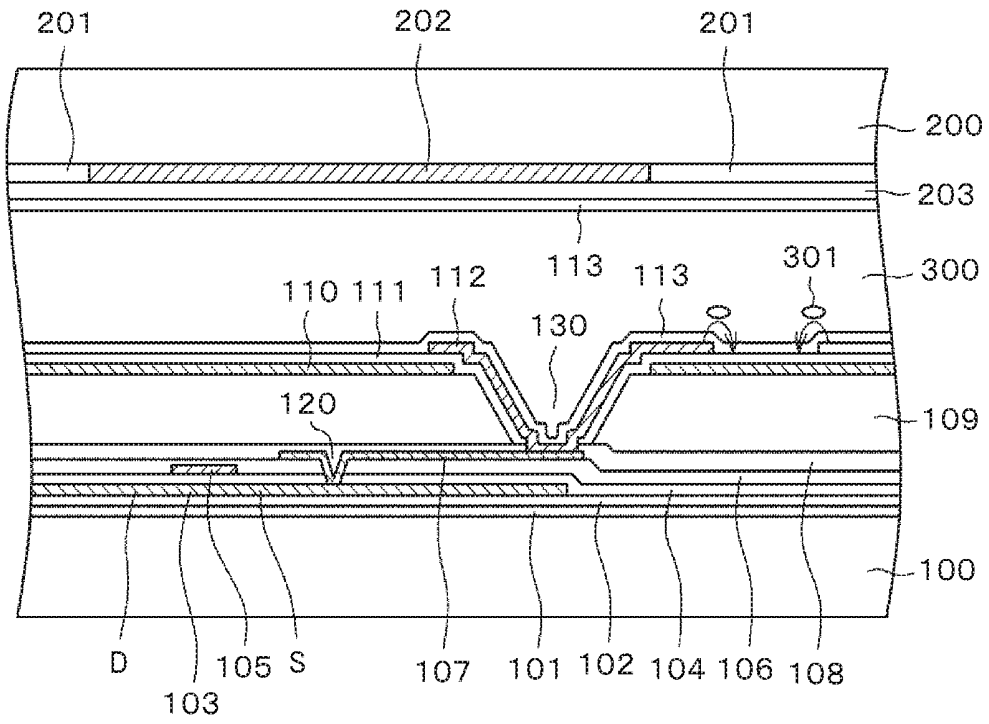
FIG. 1


201
202
201
200
203
113
113
301
300
110
111
112
130
120
109
100
D
103
105
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101
102
104
106
108

FIG. 2

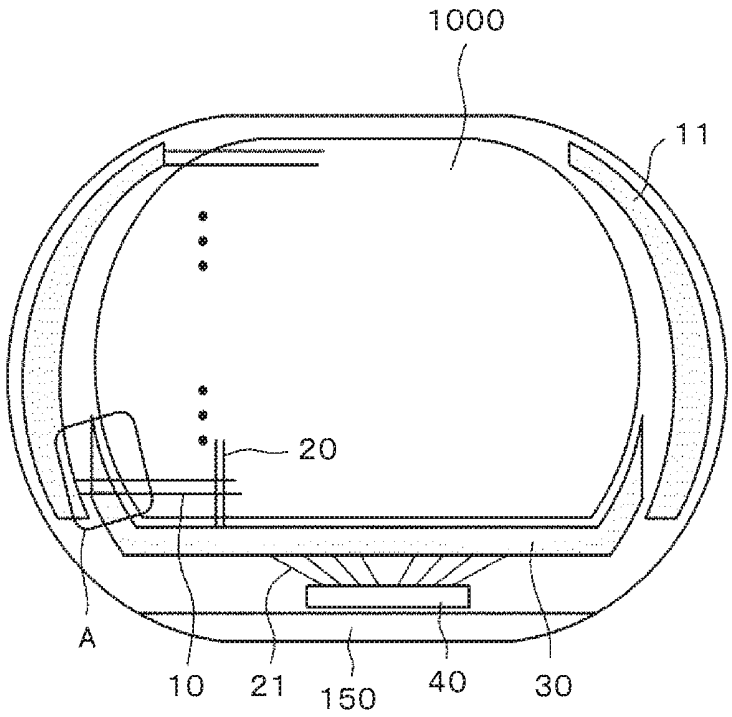


FIG. 3

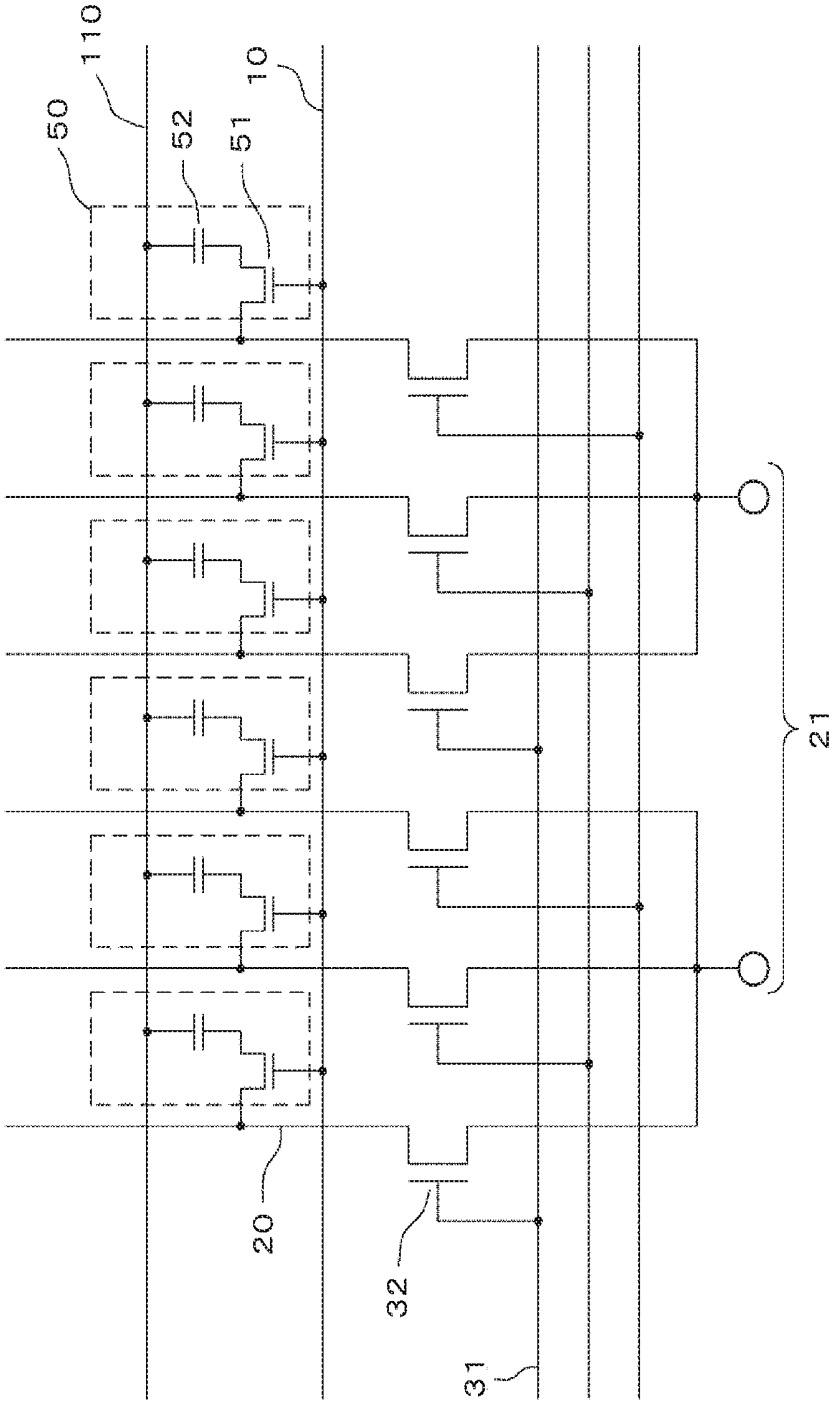


FIG. 4

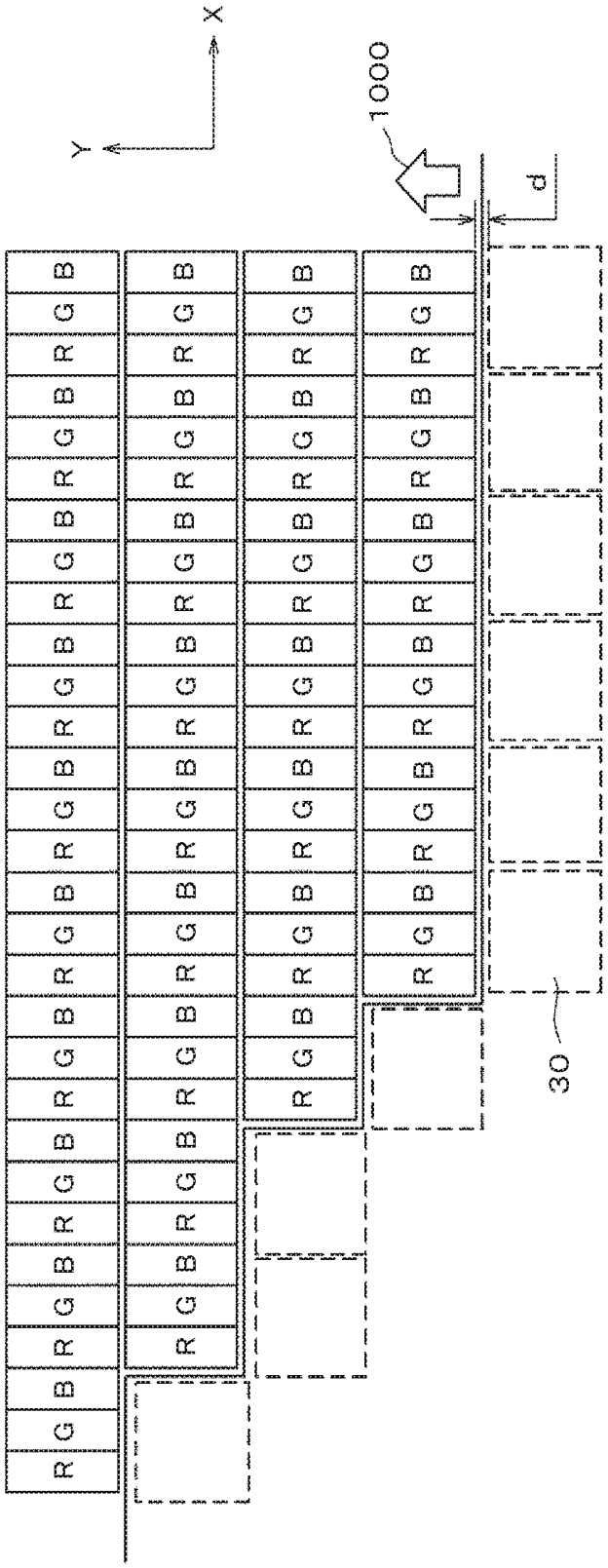


FIG. 5

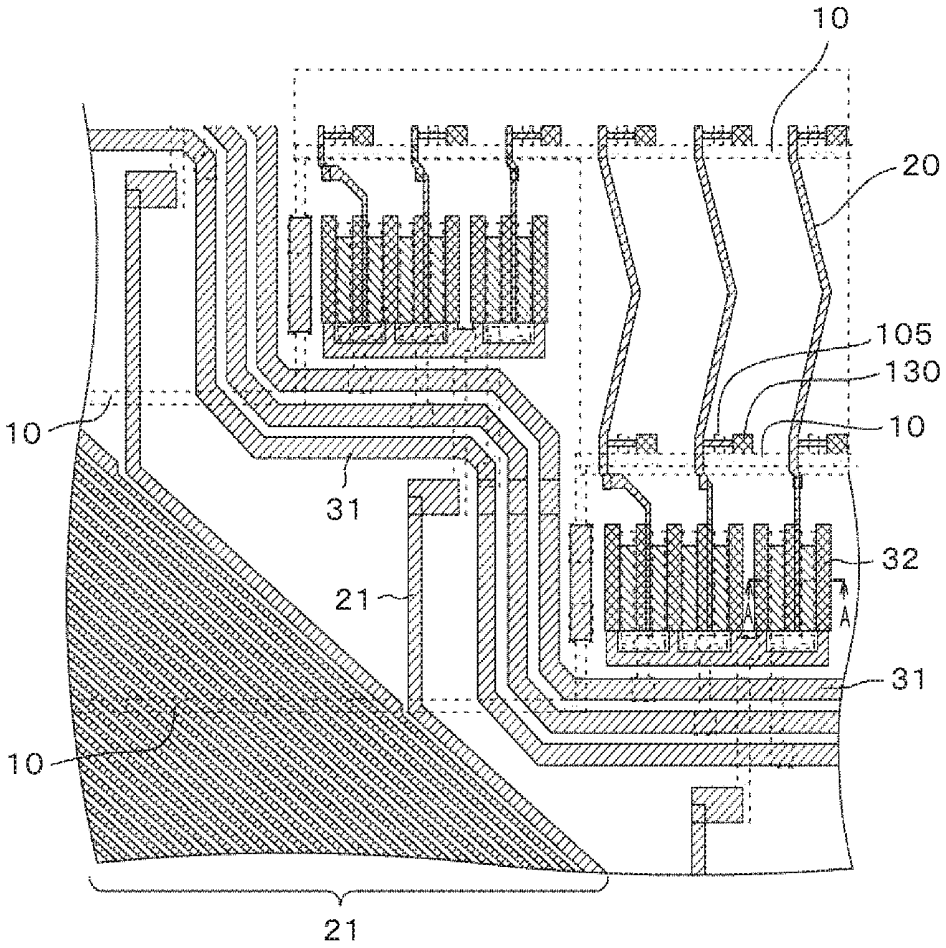


FIG. 6

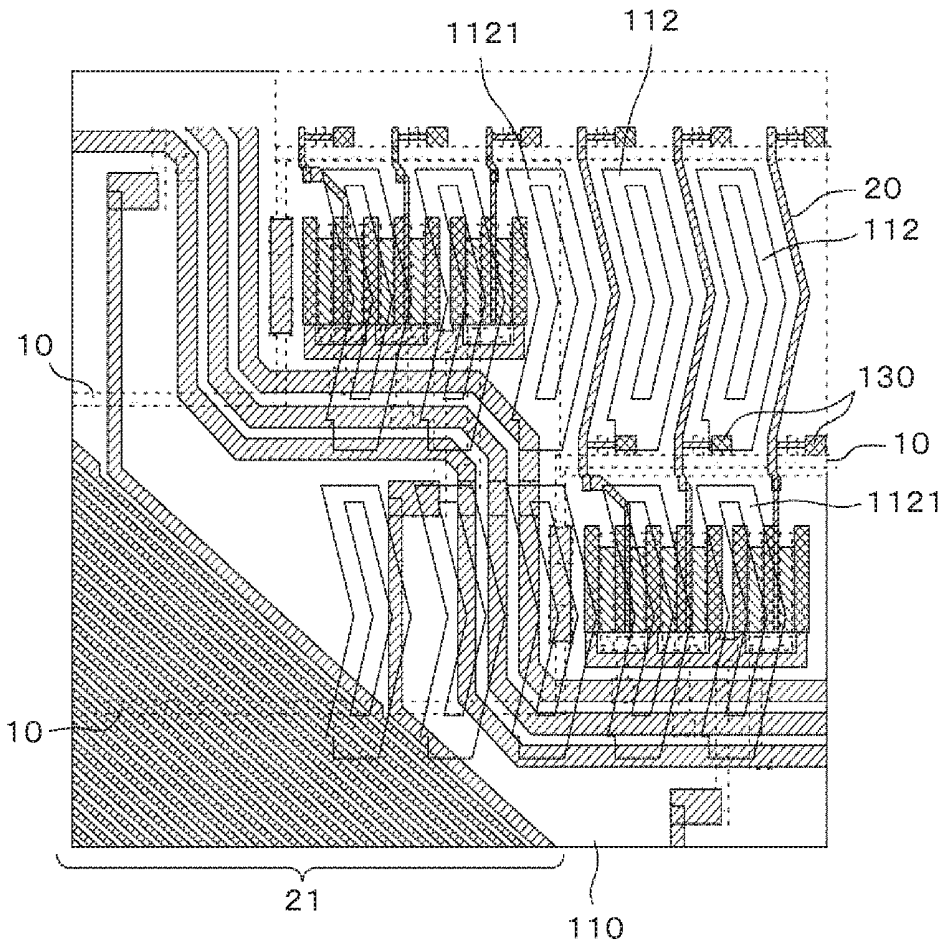


FIG. 7

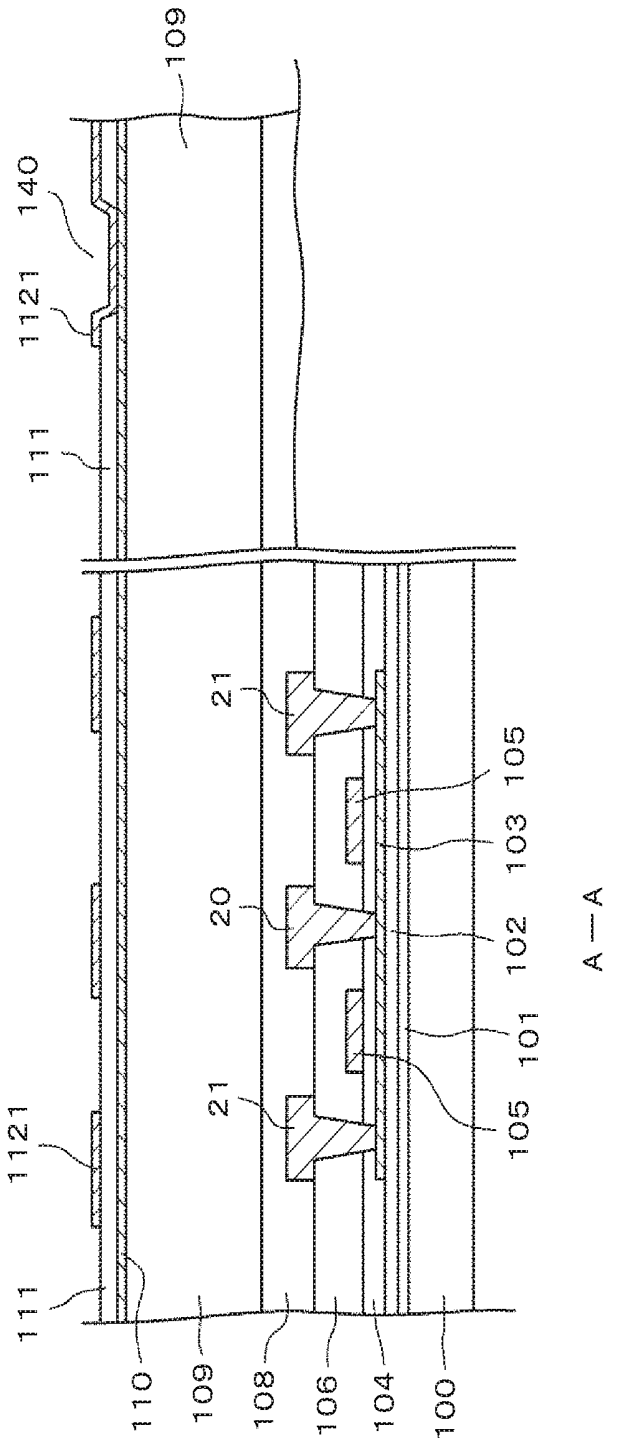

109
140
1121
111
21
105
103
20
102
101
21
105
1121
111
110
109
108
106
104
100
A—A

FIG. 8

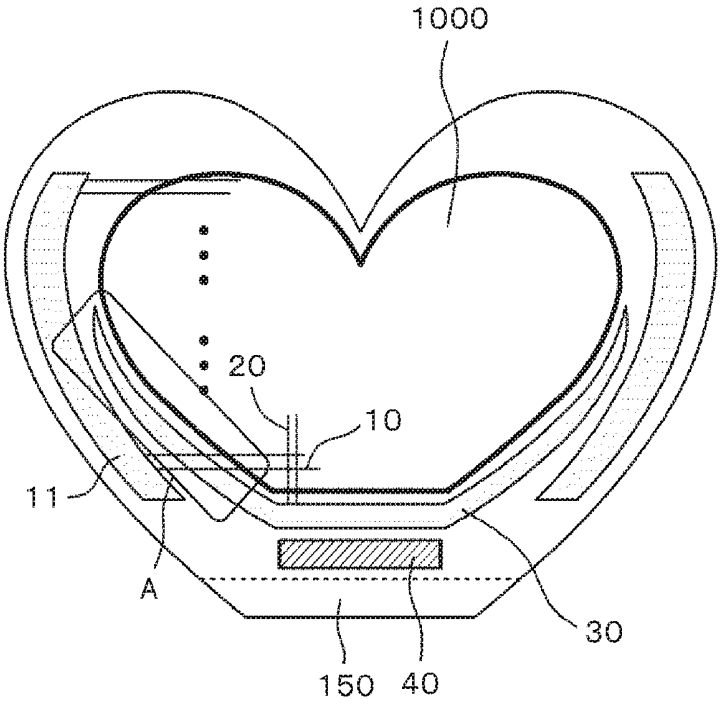
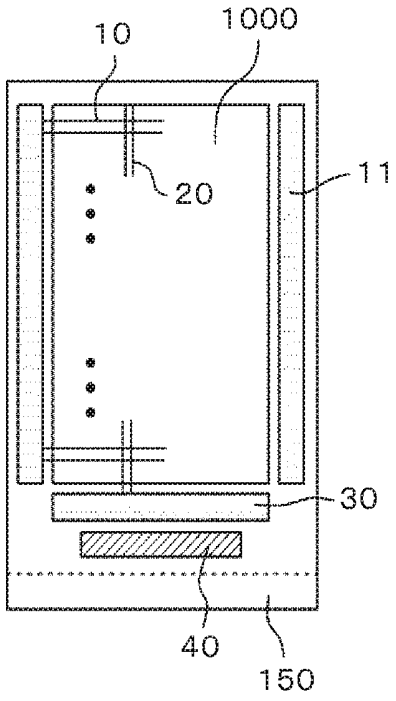


FIG. 9



LIQUID CRYSTAL DISPLAY DEVICE

CLAIM OF PRIORITY

The present application claims priority from Japanese Patent Application JP 2015-214375 filed on Oct. 30, 2015, the content of which is hereby incorporated by reference into this application.

BACKGROUND

The present invention relates to a display device, and more particularly, to the display device having a display region and an outer shape configured into the shape other than a rectangle.

The liquid crystal display device as one of the display devices includes a TFT substrate having pixels including pixel electrodes and thin film transistors (TFT) arrayed in a matrix, a counter substrate which faces the TFT substrate, and a liquid crystal interposed between the TFT substrate and the counter substrate. An image is formed by controlling the luminous transmittance of liquid crystal molecules for each pixel. The use of the flat and light-weight liquid crystal display device has been extended in various fields.

In most cases, the liquid crystal display device has the display region or the outer shape formed into a rectangle. However, the display device used for the automobile or various types of game machines may be required to have the display region or the outer shape formed into the shape other than a rectangle. Japanese Unexamined Patent Application Publication No. 2008-292995 discloses the problem of the scanning line driving circuit, which occurs owing to the shape of the display device other than a rectangle, and the countermeasure to be taken for coping with the problem.

SUMMARY

In the case where the display region is shaped other than a rectangle, layouts of the peripheral circuits and wirings which are arranged around the display device will be different from the layout of those on the rectangular display region. The display device shaped other than a rectangle may cause the problem that will be hardly caused by the rectangular display region. The display region shaped other than a rectangle will be referred to as a "variant-shape display region", and the display panel having the display region shaped other than a rectangle will be referred to as a "variant-shape display panel" hereinafter.

The variant-shape display panel may be mostly demanded to exhibit high resolution. The high resolution may require more pixels in the lateral direction as well as the number of drain lines for supplying video signals to the pixels accordingly. The increase in the number of the drain lines may increase the number of the drain routing lines in the area outside the display region, which enlarges the area of the wiring region for the increased drain routing lines. Recently, the width from the end of the display region to the end of the display panel, that is, the frame region has been increasingly demanded to be reduced. It is necessary to reduce the number of drain routing lines for the purpose of reducing the frame region.

The technique for reducing the number of drain routing lines has been introduced for the purpose of preventing increase in the number of those lines. That is, the selector circuit to be described later is used for reducing the number of the video signal lines supplied from the driver IC to ½ or ⅓. Use of the selector circuit for the variant-shape display region causes interference between the selector circuit and the scanning line or between the common wiring and the selector circuit (intersection on the layout, or electrical effect owing to intersection or proximity).

It is an object of the present invention to provide the display device configured to have the display region with reduced frame area in spite of the variant-shape display panel with the variant-shape display region including the selector circuit.

Specifically, the present invention is configured as described below.

(1) The liquid crystal display device in which an outer shape of the display region is shaped other than a rectangle, which includes a TFT substrate on which scanning lines extending in a first direction are arranged along a second direction, drain lines extending in the second direction are arranged along the first direction, and pixels are formed in the regions defined by the scanning lines and the drain lines, and a counter substrate disposed to face the TFT substrate via the liquid crystal. The driver for supplying video signals is disposed outside the display region. The selector with the selector TFT is disposed between the display region and the driver. Video signal lines are disposed between the driver and the selector, and the drain lines are disposed between the selector and the display region. The relationship between the number of the drain lines corresponding to the display region, that is, Nd and the number of the video signal lines corresponding to the drain line, that is, Nv is expressed as Nd/Nv=n, where n denotes an integer equal to or larger than 2.

The scanning circuit for supplying the scanning signal to the scanning line is disposed outside the display region, and the selector is disposed between the scanning line and the display region, or between the scanning circuit and the display region. The selector is covered with the ITO as the common electrode, and the common bus wiring is disposed outside the selector.

(2) The selector control signal line for applying the gate voltage to the selector TFT is formed on the same layer on which the drain lines are formed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view of a display region of a liquid crystal display device;

FIG. **2** is a view showing an example of a variant-shape display panel;

FIG. **3** is a view showing an equivalent circuit representing the selector structure;

FIG. **4** is a schematic view representing a peripheral part of the display region;

FIG. **5** is a plan view showing a layout of the peripheral part of the display region in the state where the drain lines have been formed;

FIG. **6** is a plan view showing a layout of the peripheral part of the display region in the state where the pixel electrodes have been formed;

FIG. **7** is a sectional view of a selector part;

FIG. **8** is a view showing another example of a variant-shape display panel; and

FIG. **9** is a plan view showing a layout of the rectangular display region.

DETAILED DESCRIPTION

The viewing angle is an important property for the liquid crystal display device as one of various types of display

devices. The viewing angle property refers to the phenomenon which varies luminance or chromaticity in accordance with the viewing angle, for example, at which the screen is viewed from the front or the diagonal direction. The IPS (In Plane Switching) method exhibits the excellent viewing angle property, which is designed to operate the liquid crystal molecules in the horizontal electric field. In the embodiment to be described later, the explanation will be made on the assumption of using the liquid crystal display device of IPS type. The present invention is applied to the structure outside the display region. However, the cross section structure of the display region will be preliminarily described for explaining the layer structure.

FIG. **1** is a sectional view of the liquid crystal display device of IPS type. The TFT shown in FIG. **1** is of so called top gate type, and employs LTPS (Low Temperature Poly-Si) as the semiconductor. Referring to FIG. **1**, a first base film **101** as SiN, and a second base film **102** as SiO_2 are applied to a glass substrate **100** through CVD (Chemical Vapor Deposition). The first base film **101** and the second base film **102** serve to prevent impurities of the glass substrate **100** from contaminating a semiconductor layer **103**.

The semiconductor film **103** formed on the second base film **102** is derived from the process of forming an a-Si film on the second base film **102** through the CVD, which is then converted into a poly-Si film through laser annealing. The poly-Si film is then patterned by photolithography. The parts of the semiconductor layer **103**, which are designated by D and S denote the drain part and the source part of the TFT, respectively.

A gate insulation film **104** formed on the semiconductor film **103** is in the form of the SiO_2 film constituted of TEOS (tetraethoxysilane) formed through the CVD. A gate electrode **105** as the scanning line is formed on the gate insulation film. The gate electrode **105** is constituted of, for example, the MoW film. Use of Al alloy may satisfy the requirement of lessening resistance of the gate electrode **105** or the scanning line **10**.

An interlayer insulation film **106** constituted of SiO_2 is formed while covering the gate electrode **105** so as to insulate the gate electrode **105** from a contact electrode **107**. A through hole **120** is formed in the interlayer insulation film **106** and the gate insulation film **104** for the purpose of connecting the source part S of the semiconductor layer **103** to the contact electrode **107**. The photolithography is conducted simultaneously for forming the through hole **120** both in the interlayer insulation film **106** and the gate insulation film **104**.

The contact electrode **107** formed on the interlayer insulation film **106** is connected to a pixel electrode **112** via a through hole **130**. The TFT is connected to the drain line at a not shown part.

The contact electrode **107** and the drain line are simultaneously formed on the same layer. Use of AlSi alloy for forming the contact electrode **107** and the drain line (which will be represented as the contact electrode **107**) is intended to lessen resistance. As the AlSi alloy causes hillock, or diffuses Al into the other layer, the AlSi is sandwiched between barrier layers or cap layers constituted of MoW (not shown), for example.

An inorganic passivation film (insulation film) **108** serves to cover the contact electrode **107** to protect the TFT as a whole. The inorganic passivation film **108** is formed through the CVD likewise the first base film **101**. An organic passivation film **109** constituted of the photosensitive acrylic resin is formed while covering the inorganic passivation film **108**. Besides the acrylic resin, it is possible to use silicone resin, epoxy resin, and polyimide rein for forming the organic passivation film **109**. As the organic passivation film **109** serving as the planarizing film is formed to have a large thickness in the range from 1 to 4 μm, and in most cases, approximately 2 μm.

The through hole **130** is formed in the organic passivation film **109** for conduction between the pixel electrode **112** and the contact electrode **107**. An ITO (Indium Tin Oxide) is derived from sputtering, which is formed as a common electrode **110**, and is patterned to remove the ITO from the through hole **130** and its periphery. The common electrode **110** may be formed into the planar shape for the respective pixels. As the common electrode is the firstly formed ITO, it may be called the first ITO.

Thereafter, the SiN to be formed as a capacitive insulation film **111** is applied to the entire surface through the CVD. The through hole is then formed in the capacitive insulation film **111** and the inorganic passivation film **108** for conduction between the contact electrode **107** and the pixel electrode **112** in the through hole **130**.

The ITO is formed by sputtering, and patterned to form the pixel electrode **112**. As the pixel electrode is the secondly formed ITO, it may be called the second ITO. The pixel electrode has a bent stripe-like surface as shown in FIG. **6**. The pixel electrode is bent so as to make the viewing angle property further uniform. The alignment film material is applied onto the pixel electrode **112** by the flexographic printing or ink jet printing, and is baked to form an alignment film **113**. The alignment film **113** is subjected to the alignment process through the rubbing method or photo alignment method using the polarized UV light.

Voltage application across the pixel electrode **112** and the common electrode **110** generates the electric force line as shown in FIG. **1**. A liquid crystal molecule **301** is rotated in the electric field so that the image is formed by controlling quantity of light passing through a liquid crystal layer **300** for each pixel.

Referring to FIG. **1**, a counter substrate **200** is formed while interposing the liquid crystal layer **300** with the TFT substrate. A color filter **201** is formed on the inner surface of the counter substrate **200**. The color filter **20** includes red, green, and blue filters for each pixel for forming a color image. A black matrix **202** is formed between the color filters **201** for improving the image contrast. The black matrix **202** serves as the light shielding film for the TFT, preventing inflow of the photoelectric current to the TFT.

An overcoat film **203** is formed while covering the color filter **201** and the black matrix **202**. Concavo-convex surfaces of the color filter **201** and the black matrix **202** may be planarized by the overcoat film **203**. The alignment film **113** is formed on the overcoat film for determining the initial alignment of the liquid crystal. Likewise the alignment film **113** at the side of the TFT substrate **100**, the rubbing method or the photo alignment method is employed for the alignment process of the alignment film **113**.

As the above-described structure is a mere example, there may be the case that the inorganic passivation film **108** is not formed for the TFT substrate **100** depending on the structure type. The process for forming the through hole **130** may also differ depending on the structure type. The present invention will be described in detail referring to the embodiment as follows.

First Embodiment

FIG. **2** shows an example of the variant-shape display panel having both a display region **1000** and an outer shape

formed into a racetrack shape, specifically, having upper and lower linear sides, and left and right curved sides. FIG. **2** is a plan view of the panel at the TFT substrate side. Referring to FIG. **2**, the display region **1000** includes laterally extending scanning lines **10**, and longitudinally extending drain lines **20**. The pixel is formed in each region defined by the scanning lines **10** and the drain lines **20**.

As FIG. **2** shows, a selector **30** and a driver IC **40** are disposed below the display region **1000**. A terminal region **150** is formed outside the driver IC **40** for connection to a flexible wiring substrate. A video signal is supplied from the driver IC **40** to the drain lines **20** on the display region **1000** via the selector **30**. The number of the drain lines **20** corresponds to the number of pixels on the display region **1000** in the lateral direction. The number of video signal lead-out lines **21** from the driver IC **40** to the selector **30** may be ⅓ of the number of the drain lines, for example. The relationship between the number of the drain lines Nd and the number of the video signal lead-out lines Nv is expressed as Nd/Nv=n, where n denotes an integer equal to or larger than 2.

Scanning circuits **11** for supplying scanning signals to the scanning lines **10** are disposed at both sides of the display region **1000**. As FIG. **2** shows, the selector **30** is disposed adjacent to the display region **1000**. As the display region **1000** has the racetrack shape, the selector **30** partially exists between the scanning circuit **11** and the display region **1000** in a region A outside the curved side of the display region **1000**. In this case, wiring interference occurs between the scanning line **10** and the selector **30**.

FIG. **9** is a plan view of the display device having the rectangular display region **1000**. Referring to FIG. **9**, the selector **30**, the driver IC **40**, and the terminal part **150** are sequentially arranged below the display region **1000**. The scan circuits **11** are disposed at both sides of the display region **1000**. In this case, there is no interference between the scanning lines **10** extending from the scanning circuit **11**, and the selector **30**.

The variant-shape display panel according to the present invention is configured to prevent interference between the scanning line **10** and the selector **30**, and reduce the frame region. FIG. **3** is a view of the equivalent circuit indicating the structure of the selector **30**, the upper side of which corresponds to the display region, and the lower side of which corresponds to the driver IC. Referring to FIG. **3**, pixels **50** each having the TFT **51** and the pixel capacitor **52** are laterally arranged. The video signals are supplied to the respective pixels **50** via the drain lines **20**. The TFTs **51** of the respective pixels **50** are controlled by the scanning lines **10**.

The selector **30** is disposed adjacent to the outermost part of the display region to reduce the number of the drain lead-out lines (video signal lead-out lines) **21** outside the display region. The selector as shown in FIG. **3** reduces the number of the video signal lead-out lines **21** output from the driver IC to ⅓ of the number of the drain lines **20**. It is therefore possible to save the area for routing wiring of the video signal lead-out lines **21**.

Meanwhile, selector control lines **31** are necessary for controlling the selector **30**. FIG. **4** is a plan view representing arrangement of the selectors **30** and the pixels **50** in a region A as shown in FIG. **2**. Referring to FIG. **4**, sets of three pixels **50** including a red pixel R, a green pixel G, and a blue pixel B are arranged into a step-like formation so that the outer end of the display region **1000** is approximated to the curve. The selectors corresponding to the respective pixel sets are disposed adjacent thereto. Unlike the general case having the common bus wiring formed adjacent to the outer end of the display region **1000** for applying the common voltage to the common electrode on the display region, the present invention is configured to dispose the selectors **30**.

Each pixel is connected to the scanning line from the scanning circuit disposed outside in the lateral direction as shown in FIG. **4**. In other words, the selector **30** includes the selector TFT, and accordingly, it is necessary to prevent interference between the scanning line and the gate electrode of the selector TFT, that is, the selector control line.

FIG. **5** is a plan view representing the wiring layout around the end part of the display region in the state where the drain lines **20** have been formed. In the display region as shown in FIG. **5**, the longitudinally extending drain lines **20** each of which is bent into the V-like shape are arranged in the lateral direction. The laterally extending scanning lines **10** are arranged in the longitudinal direction. The respective pixels are formed in the regions defined by the drain lines **20** and the scanning lines **10**, on which the pixel electrodes are formed. As FIG. **5** shows, the pixel electrode has not been formed yet, and the part at which the drain lines **20** are formed becomes the display region as dotted line indicates.

The selector TFTs **32** are disposed adjacent to the pixel at the outermost periphery for the respective drain lines **20**. Three selector control lines **31** extend outside the selector TFTs **32** for sending the gate signal to the respective selector TFTs **32**. In order to prevent interference between the scanning line **10** and the selector control line **31**, the selector control lines **31** are wired on the same layer on which the drain lines **20** are formed so as to be applied onto the same layer on which the scanning lines **10** are formed via the through hole just before connection with the selector TFTs **32**. This makes it possible to dispose the selectors **30** adjacent to the display region in spite of the variant-shape display region.

The video signal is sent to the set of three selector TFTs **32** via the common video signal lead-out line **21**. The video signal is divided and allocated to the drain lines **20** by the signal via the selector control line **31**. As a result, the number of the video signal lead-out lines **21** is ⅓ of the number of the drain lines **20** as FIG. **5** shows. The present invention is configured to dispose the selector adjacent to the display region so that the video signal lead-out line **21** intersects the scanning line. In the case where the selector is disposed apart from the display region, the number of the crossing points between the video signal lead-out lines and the scanning lines is reduced, which may increase the number of crossing points with the drain lines. The structure according to the present invention ensures reduction in the number of the crossing points between the scanning lines and the drain lines. Furthermore, the selector control line **31** interposed between the video signal lead-out line and the selector allows reduction in the crossing points between the selector control lines and the video signal lead-out lines, while reducing the length of the selector control line. Referring to FIG. **5**, the selector control line is disposed along the selector. It is also possible to dispose the selector control line parallel to the video signal lead-out lines. This makes it possible to further reduce the length of the selector control line.

As FIG. **4** shows, the number of pixels in Y-direction corresponding to each selector varies in accordance with the X-direction. For example, in the linear outer shape part of the display region **1000**, 320 pixels are covered by the

selector **30**. In the curved outer shape part of the display region, the minimum of 6 pixels are covered by the selector **30**.

In the aforementioned state, each resistance or capacity of the wiring covered by the respective selectors **30** varies, and accordingly, the magnitude or delay of the signal may vary depending on the location. The present invention is configured to change the channel width of the selector TFT **32** in accordance with the location for the purpose of preventing the variance. For example, the channel width of the selector TFT **32** to be disposed on the linear part is made larger than the channel width of the selector TFT **32** to be disposed on the curved part. The channel width of the selector TFT **32** to be disposed on the curved part is also changed in accordance with the location. This makes it possible to generate uniform image in spite of the variant-shape display panel.

FIG. **6** is a plan view showing a state where the pixel electrodes **112** have been formed on the same region as shown in FIG. **5**. In other words, FIG. **6** represents that the inorganic passivation film, the organic passivation film, the common electrode, the capacitive insulation film, and the pixel electrode have been laminated to form the layout on the region as shown in FIG. **5**. As FIG. **6** shows, the part at which the drain lines **20** are formed becomes the display region as dotted line indicates.

FIG. **6** shows that the common electrode **110** as the transparent electrode is formed over the entire surface except the through hole **130**. On the display region, the pixel electrode **112** is formed through the ITO process in the region defined by the drain line **20** and the scanning line **10**. A dummy pixel electrode **1121** having the same shape as that of the pixel electrode **112** is formed outside the display region at the same pitch as the pixel electrode **112**. This makes it possible to form the pixel electrode **112** at the outermost part of the display region under the same process conditions as those for forming the pixel electrodes **112** in the display region. It is possible to apply the common voltage to the dummy pixel electrode **1121**, which will be described later.

FIG. **7** is a sectional view taken along line A-A of FIG. **5**, illustrating a cross section of the area around the selector TFT **32**. The layer structure is the same as the cross section structure of the display region as described referring to FIG. **1**. In other words, the gate insulation film **104** is formed on the semiconductor layer **103**, on which the gate electrode **105** is formed. The interlayer insulation film **106** is formed to cover the resultant layer.

The gate electrode **105** is connected to the selector control line **31**, and the source electrode corresponds to the video signal line **21**. The drain electrode corresponds to the drain line **20**. In other words, two source electrodes are formed in parallel with each other to constitute the selector TFT **32**. The inorganic passivation film **108** is formed while covering the drain electrode and the source electrode, on which the organic passivation film **109** is formed. The common electrode **110** planarized by the ITO process is formed on the organic passivation film **109**.

The capacitive insulation film **111** is formed to cover the common electrode **110**, on which the dummy pixel electrodes **1121** are formed. The present invention is configured to allow the common electrode **110** to cover the upper part of the selector TFT **32**. The common electrode **110** is formed successively with the common electrode **110** on the display region. The aforementioned structure allows the common electrode **110** to shield the selector **30**. The common voltage is applied to the common electrode **110** from the common wiring (common bus wiring) disposed outer than the selector **30**.

Generally, the common bus wiring is formed adjacent to the display region. The present invention is configured to form the common bus wiring at the position outer than the selector **30**. The structure allows the selector control line **31** to be formed on the same layer on which the drain line **20** or the common bus wiring is formed.

If the dummy pixel electrode **1121** as shown in FIG. **6** is not required to be brought into the floating state, a through hole **140** is formed in the capacitive insulation film **111** as indicated by the right side of FIG. **7** so that the common voltage is applied to the dummy pixel electrode **1121**. The through hole **140** may be formed in the capacitive insulation film **111** simultaneously with formation of the through hole **130** in the display region.

As described above, the present invention allows the variant-shape display panel to form the selector adjacent to the display region, which ensures to prevent increase in the area of the frame region of the variant-shape display panel. The selector may be shielded by the common electrode, and the channel width of the selector TFT is varied in accordance with the location, resulting in uniform display screen on the variant-shape display panel.

The variant-shape display panel with racetrack shape as shown in FIG. **2** has been described. The present invention, however, is applicable to the heart-like variant-shape display panel as shown in FIG. **8**. The substantially the same structure as the one described referring to FIG. **2** may be applied to the shape as shown in FIG. **8**. That is, the structure which is substantially the same as the region A shown in FIG. **2** may be applied to the region A as shown in FIG. **8**. Referring to FIG. **8**, however, as the upper part of the display region is not linearly shaped, the capacity of the selector TFT to be disposed below the display region, that is, the channel width has to be changed even at the linear part.

Each of the variant-shape display regions as shown in FIGS. **2** and **8** is formed by combining the linear part and the curved part. However, the present invention is applicable to the display device with the display region formed by combining linear sides into such shape as triangle, pentagon, and hexagon. Referring to FIGS. **2** and **8**, the scanning circuits are disposed at both sides of the display screen. However, the present invention is applicable to the structure having the scanning circuits disposed at one side of the display screen. Application of the present invention is not limited to the liquid crystal display device, but to the display device of arbitrary type, such as the organic EL display device, which includes the display region shaped other than a rectangle, and the selector (switching circuit) for time division supplying the video signal to the drain lines (video signal lines) on the display region.

What is claimed is:

1. A display device comprising a display region having a shape other than a rectangle and including a TFT substrate on which a scanning line, drain lines and video signal lead-out lines are formed, wherein:

a selector is disposed between the drain lines and the video signal lead-out lines;

the scanning line is connected to a scanning circuit for supplying a scanning signal;

the scanning line and the video signal lead-out lines cross with each other;

the number of pixels in an extending direction of the scanning line in the display region is different from the number of pixels in an extending direction of the drain lines; and

the selector has selector TFTs, and a channel width of one of the selector TFTs corresponding to a row having a larger number of the pixels in the extending direction of the drain lines is larger than a channel width of another of the selector TFTs corresponding to a row having a smaller number of the pixels in the extending direction of the drain lines.

2. The display device according to claim **1**, wherein a common wiring is disposed between the selector and the scanning circuit.

3. The display device according to claim **1**, wherein a selector control line connected to gates of the selector TFTs comprises the same layer as the drain lines.

4. The display device according to claim **1**, wherein a selector control line connected to gates of the selector TFTs is disposed between the video signal lead-out lines and the selector.

5. The display device according to claim **2**, wherein a selector control line connected to gates of the selector TFTs is disposed between the video signal lead-out lines and the selector.

6. The display device according to claim **4**, wherein the selector control line comprises the same layer as the drain line.

7. The display device according to claim **2**, wherein the scanning circuit is disposed between the common wiring and an end of the TFT substrate.

8. The display device according to claim **3**, wherein:

the selector control line and the scanning line cross with each other via an insulation film; and

the selector control line and the video signal lead-out lines cross with each other via the insulation film.

9. The display device according to claim **1**, wherein:

the video signal lead-out lines are connected to a driver IC;

the driver IC is formed along a first side of the display region; and

the scanning circuit is formed in a scanning circuit region that is along a second side adjacent to the first side of the display region and a third side opposite the second side.

10. The display device according to claim **9**, wherein:

an outer shape of the display region is formed by combining a linear part and a curved part; and

the driver IC is disposed corresponding to the linear part.

11. The display device according to claim **9**, wherein:

an outer shape of the display region is formed by combining a linear part and a curved part;

the driver IC is disposed corresponding to the linear part; and

a channel width of the selector TFT corresponding to the linear part is larger than the channel width of the selector TFT corresponding to the curved part.

12. A display device comprising a display region having a shape other than a rectangle and including a TFT substrate on which a scanning line, drain lines and video signal lead-out lines are formed, wherein:

a selector is disposed between the drain lines and the video signal lead-out lines, and connected to the drain lines and the video signal lead-out lines; the scanning line is connected to a scanning circuit for supplying a scanning signal; the scanning line and the video signal lead-out lines cross with each other; an outer shape of the display region is formed by combining a linear part and a curved part; the video signal lead-out line is connected to a driver IC, and the driver IC is disposed along a first side of the display region corresponding to the linear part; the scanning circuit is formed in a scanning circuit region which is along a second side corresponding to the curved part adjacent to the first side of the display region and a third side opposite the second side; and the selector has selector TFTs, a channel width of one of the selector TFTs corresponding to the linear part is larger than a channel width of another of the selector TFTs corresponding to the curved part.

13. The display device according to claim **12**, wherein a common wiring is disposed between the selector and the scanning circuit.

14. The display device according to claim **12**, wherein a selector control line connected to gates of the selector TFTs comprises the same layer as the drain lines.

15. The display device according to claim **12**, wherein a selector control line connected to gates of the selector TFTs is disposed between the video signal lead-out line and the selector.

16. The display device according to claim **13**, wherein a selector control line connected to gates of the selector TFTs is disposed between the video signal lead-out line and the selector.

17. The display device according to claim **16**, wherein the selector control line comprises the same layer as the drain line.

18. The display device according to claim **13**, wherein the scanning circuit is disposed between the common wiring and an end of the TFT substrate.

19. The display device according to claim **14**, wherein:

the selector control line and the scanning line cross with each other via an insulation film; and

the selector control line and the video signal lead-out line cross with each other via the insulation film.

* * * * *

专利名称(译)	液晶显示装置		
公开(公告)号	US10114260	公开(公告)日	2018-10-30
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[标]申请(专利权)人(译)	株式会社日本显示器		
申请(专利权)人(译)	日本展示INC.		
当前申请(专利权)人(译)	日本展示INC.		
[标]发明人	SUZUKI TAKAYUKI ABE HIROYUKI		
发明人	SUZUKI, TAKAYUKI ABE, HIROYUKI		
IPC分类号	G02F1/1362 G02F1/1333 G02F1/133 G02F1/1368 H01L27/12 G09G3/36 G02F1/1345 G02F1/1335 G02F1/1337 G02F1/1343		
CPC分类号	G02F1/136286 G02F1/1368 G02F1/13306 G02F1/133345 G09G3/3688 H01L27/124 H01L27/1222 G02F1/1345 G09G2310/0297 G02F1/13378 G02F1/13439 G02F1/133512 G02F1/133514 G02F1/134363 G02F2001/133519 G02F2001/136295 G02F2201/121 G02F2201/123 G02F2201/56 G02F2203/04 G09G2300/0426 G02F1/13452		
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优先权	2015214375 2015-10-30 JP		
其他公开文献	US20170123285A1		
外部链接	Espacenet		

摘要(译)

一种液晶显示装置，具有形成为矩形以外的显示区域的外形。用于提供视频信号的驱动器设置在显示区域外部。具有选择器TFT的选择器设置在显示区域和驱动器之间。视频信号线设置在驱动器和选择器之间，并且漏极线设置在选择器和显示区域之间。用于向扫描线提供扫描信号的扫描电路设置在显示区域的外部。选择器设置在扫描线和显示区域之间，并且用ITO作为公共电极覆盖。公共总线布线设置在选择器外部。