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Inventor(s)	Nakajima; Osamu

Liquid crystal panel and electronic device

Abstract

A liquid crystal panel includes a counter substrate, a cover glass arranged at the counter substrate with an adhesive therebetween, an element substrate that is arranged at a surface of the counter substrate opposite to a surface at which the cover glass is arranged with a liquid crystal layer therebetween, and a casing member that is bonded to the counter substrate, the cover glass, and the element substrate via another adhesive. The another adhesive is provided on side surfaces of the counter substrate, the cover glass, and the element substrate except for one side of the element substrate. The counter substrate, the cover glass, and the element substrate are arranged in a state in which the side surfaces thereof are substantially aligned in plan view except for the one side.

Inventors: **Nakajima; Osamu (Hara-Mura, JP)**

Applicant: **SEIKO EPSON CORPORATION** (Tokyo, JP)

Family ID: **1000008748460**

Assignee: **SEIKO EPSON CORPORATION (Tokyo, JP)**

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Primary Examiner: Kim; Richard H

Attorney, Agent or Firm: JCIPRNET

Background/Summary

(1) The present application is based on, and claims priority from JP Application Serial Number 2023-051083, filed Mar. 28, 2023, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

(2) The present disclosure relates to a liquid crystal panel and an electronic device.

2. Related Art

(3) As is well known, a liquid crystal panel has a configuration in which a liquid crystal is sandwiched between an element substrate and a counter substrate. When such a liquid crystal panel is used as a light valve of a projection-type display apparatus, an image generated by the liquid crystal panel is enlarged and projected. In this case, when dust or the like adheres to the non-opposing surface of the element substrate or the opposing surface, the dust is enlarged and projected, so that the display quality is significantly deteriorated. The non-opposing surface means a surface of the element substrate opposite to the surface facing the counter substrate, or a surface of the counter substrate opposite to the surface facing the element substrate.

(4) Since light of high luminance is incident on the liquid crystal panel, it is necessary to provide a configuration for dissipating heat from the liquid crystal panel.

(5) For this reason, there is known a technique by which a liquid crystal panel having a cover glass bonded to a non-opposing surface of a counter substrate is fitted into and bonded to a casing member to prevent dust on the liquid crystal panel and promote heat dissipation from the liquid crystal panel (for example, see JP-A-2006-58605).

(6) However, with the above-described technique, stress is generated due to contraction of an adhesive for bonding a casing agent, and the substrate of the liquid crystal panel may be deformed

by the stress. When the substrate of the liquid crystal panel is deformed, a gap (cell gap) for sealing the liquid crystal becomes non-uniform, so that there is a problem that display quality is remarkably deteriorated.

SUMMARY

(7) In order to solve the above problems, a liquid crystal panel according to one aspect of the present disclosure includes a first substrate, a second substrate arranged at the first substrate with a first adhesive therebetween, a third substrate that faces a surface of the first substrate opposite to a surface facing the first adhesive layer is arranged and that is arranged with a liquid crystal layer therebetween, and a casing member bonded to the first substrate, the second substrate, and the third substrate via a second adhesive, in which the second adhesive is provided on side surfaces of the first substrate, the second substrate, and the third substrate, except for one side of the third substrate, and the first substrate, the second substrate, and the third substrate are arranged in a state in which the side surfaces thereof are substantially aligned in plan view except for the one side of the third substrate.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of a configuration of a liquid crystal panel according to an embodiment.

(2) FIG. **2** is a cross-sectional view of a configuration of the liquid crystal panel.

(3) FIG. **3** is a plan view of a configuration of the liquid crystal panel.

(4) FIG. **4** is a diagram illustrating an application position of an adhesive to the liquid crystal panel.

(5) FIG. **5** is a diagram illustrating a state in which the liquid crystal panel is bonded to a casing member.

(6) FIG. **6** is a diagram illustrating a situation in which the liquid crystal panel is being bonded to the casing member.

(7) FIG. **7** is a diagram illustrating a misalignment during casing of the liquid crystal panel.

(8) FIG. **8** is a diagram illustrating a projection-type display apparatus to which the liquid crystal panel is applied.

(9) FIG. **9** is a perspective view of a configuration of a liquid crystal panel according to a comparative example.

(10) FIG. **10** is a diagram illustrating an application position of an adhesive to the liquid crystal panel according to the comparative example.

(11) FIG. **11** is a diagram simply illustrating a defect in the liquid crystal panel according to the comparative example.

(12) FIG. **12** is a diagram simply illustrating a defect in the liquid crystal panel according to the comparative example.

(13) FIG. **13** is a diagram simply illustrating a defect in the liquid crystal panel according to the comparative example.

DESCRIPTION OF EMBODIMENTS

(14) Hereinafter, a liquid crystal panel according to an embodiment will be described with reference to the drawings. In each drawing, dimensions and scales of each part are appropriately made different from actual ones. Embodiments described below are suitable specific examples, and various technically preferable limitations are applied, but the scope of the disclosure is not limited to these embodiments unless they are specifically described in the following description as limiting the disclosure.

(15) FIG. **1** is a perspective view of a configuration of a liquid crystal panel according to an embodiment, and FIG. **2** is a cross-sectional view of the liquid crystal panel taken along a Y-Z

plane in FIG. **1**.
(16) As illustrated in FIG. **1**, a liquid crystal panel **10** has a configuration in which a cover glass **32**, a counter substrate **12**, an element substrate **11**, and a cover glass **31** are stacked.
(17) The liquid crystal panel **10** is a transmissive type, for example. In the liquid crystal panel **10**, as is well known, the element substrate **11** provided with pixel electrodes and the counter substrate **12** provided with a common electrode are bonded to each other with a sealing material **14** such that their electrode formation surfaces face each other with a certain clearance maintained therebetween, and a liquid crystal **16** is sealed in this clearance to constitute a liquid crystal layer.
(18) In addition to the pixel electrodes, scanning lines, data lines, transistors for switching between the data lines and the pixel electrodes, driving circuits for driving the scanning lines and the data lines, and the like are provided on the element substrate **11**. However, since these elements are not important, description thereof will be omitted.
(19) In the drawings, the X direction indicates an extending direction of the scanning lines, and generally indicates a long-side direction of a rectangular display region. The Y direction indicates an extending direction of the data lines, and generally indicates a short-side direction of the display region in plan view. The Z direction is a direction perpendicular to the X-Y plane and indicates a direction in which light enters the liquid crystal panel **10**. The plan view refers to a view of the liquid crystal panel **10** from the Z direction or from a direction opposite to the Z direction.
(20) As is well known, a polarizing plate (not illustrated) is arranged at the incident side and the emission side of the liquid crystal panel **10**, and the transmittance of the liquid crystal element changes according to the voltage applied by the pixel electrodes and the common electrode. Therefore, a display image is generated in the display region in which the pixel electrodes are arranged in plan view.
(21) Each of the element substrate **11** and the counter substrate **12** has a rectangular shape in plan view. The element substrate **11** and the counter substrate **12** are bonded to each other in a state where three sides thereof are aligned in plan view, but one side of the element substrate **11** in the long-side direction protrudes from the counter substrate **12** in the Y direction in plan view. For convenience, a portion of the element substrate **11** that protrudes from the counter substrate **12** will be referred to as a protruding portion **110**.
(22) One end of an FPC substrate **194** is coupled to a surface of the protruding portion **110** facing the counter substrate **12**. FPC is an abbreviation for flexible printed circuit. The other end of the FPC substrate **194** has a plurality of terminals **196** to be coupled to a host device. When the plurality of terminals **196** is coupled to the host device, a data signal according to the gradation level of the pixels, a control signal for controlling the drive circuit, and the like are supplied from the host device to the liquid crystal panel **10** via the FPC substrate **194**.
(23) The cover glass **32** is a dust-proof glass that prevents dust or the like from adhering to the light incident surface of the counter substrate **12**, that is, the non-facing surface opposite to the surface of the counter substrate **12** facing the element substrate **11**. The sizes of the cover glass **32** in the X direction and the Y direction are substantially the same as the sizes of the counter substrate **12** in the X direction and the Y direction in this order. The cover glass **32** is bonded to the incident surface of the counter substrate **12** with an adhesive **42** in a state where the sides of the counter substrate **12** are aligned in plan view. Accordingly, the counter substrate **12** and the cover glass **32** are arranged in a state where the side surfaces thereof are substantially aligned with each other in plan view.
(24) The cover glass **31** is a dust-proof glass that prevents dust or the like from adhering to the light emission surface of the element substrate **11**, that is, the non-facing surface opposite to the surface of the element substrate **11** facing the counter substrate **12**. The sizes of the cover glass **31** in the X direction and the Y direction are substantially the same as the sizes of the element substrate **11** in the X direction and the Y direction in this order. The cover glass **31** is bonded to the emission surface of the element substrate **11** with an adhesive **41** in a state where the sides of the element

substrate **11** are substantially aligned in plan view. Accordingly, the element substrate **11** and the cover glass **31** are arranged in a state where the side surfaces thereof are substantially aligned with each other in plan view.

(25) FIG. **3** is a plan view of a configuration of the liquid crystal panel **10**.

(26) In plan view of the liquid crystal panel **10**, for the sake of convenience, among the four sides of the element substrate **11** and the counter substrate **12**, a side facing the protruding portion **110** in the long-side direction will be referred to as L**1**. In addition, a side opposite to the side L**1** and defined by the element substrate **11** and the cover glass **31** will be referred to as L**21**, and a side opposite to the side L**1** and defined by the counter substrate **12** and the cover glass **32** will be referred to as L**22**. Among the four sides of the element substrate **11** and the counter substrate **12**, a side in the X direction in the short-side direction will be referred to as L**3**, and a side facing the side **13** will be referred to as L**4**.

(27) In the liquid crystal panel **10**, at the sides L**1**, L**3**, and L**4**, the side surfaces of the element substrate **11**, the counter substrate **12**, and the cover glasses **31** and **32** are substantially aligned except for the protruding portion **110**. In the liquid crystal panel **10**, the side surfaces of the element substrate **11** and the cover glass **31** are substantially aligned with each other at the side L**21**, and the side surfaces of the counter substrate **12** and the cover glass **32** are substantially aligned with each other at the side L**22**.

(28) The liquid crystal panel **10** is actually combined with optical members such as a light source and a lens in a state of being attached to a casing member. The liquid crystal panel **10** is bonded to the casing member with an adhesive.

(29) FIG. **4** is a diagram for describing application of an adhesive for bonding the liquid crystal panel **10** to the casing member.

(30) The adhesive **51** for bonding the liquid crystal panel **10** to the casing member is applied at the side L**1** to the side surfaces of the cover glass **32**, the counter substrate **12**, the element substrate **11**, and the cover glass **31** by a dispenser or the like. The adhesive **51** is applied at the side L**22** to the side surfaces of the cover glass **32** and the counter substrate **12**, and is applied at the side L**21** to the side surfaces of the element substrate **11** and the cover glass **31**.

(31) As the adhesive **51**, an epoxy resin adhesive, an ultraviolet curing adhesive, or the like is used, for example. The adhesive **51** is not applied to the protruding portion **110** as described below because there is a step between the element substrate **11** and the counter substrate **12** in a cross-sectional view.

(32) FIG. **5** is a diagram illustrating a state in which the liquid crystal panel **10** is attached to a casing member **80** by the adhesive **51**. In the drawing, reference numeral **82** denotes an opening in the display region of the liquid crystal panel **10**. Light from the light source enters the liquid crystal panel **10** through the opening **82**. The casing member **80** is provided with a slit **84** through which the FPC substrate **194** passes. The casing member **80** is made of metal such as aluminum, for example, in order to enhance heat dissipation of the liquid crystal panel **10**.

(33) The liquid crystal panel **10** to which the adhesive **51** is applied is actually inserted into the casing member **80**, vertically inverted from the state in FIG. **4**, specifically, with the cover glass **32** in the lead as indicated by arrows in FIG. **6**, and is bonded to the casing member **80**.

(34) In inserting the liquid crystal panel **10** into the casing member **80**, it is necessary to consider dripping of the adhesive **51** applied to the side surfaces of the element substrate **11** and the cover glass **31** at the side L**21**. Therefore, a position P**1** of the end surface of the casing member **80** facing the side surfaces of the cover glass **32** and the counter substrate **12** at the side L**21** is located at the left side in FIG. **6**, that is, at the display region side with respect to the position P**2** of the side surfaces of the element substrate **11** and the cover glass **31** at the side L**22**. Accordingly, even when the adhesive **51** applied to the side surfaces of the element substrate **11** and the cover glass **31** drips at the side L**22** drips, the drips of the adhesive **51** are received by the casing member **80**, so that contamination of the periphery is prevented.

(35) It is preferable that the counter substrate **12** and the cover glass **31** are bonded to each other in a state where four sides thereof are aligned in plan view. However, the casing member **80** and the liquid crystal panel **10** are designed so that the counter substrate **12** and the cover glass **31** can be bonded to the casing member **80** with the adhesive **51** as long as the misalignment between the counter substrate **12** and the cover glass **31** is within 0.5 mm in plan view.
(36) For example, as illustrated in FIG. **7**, even when the counter substrate **12** and the cover glass **31** are misaligned as indicated by a broken line Er**1** at the side L**22** (side L**1**), the liquid crystal panel **10** can be bonded to the casing member **80** with the adhesive **51** as long as the misalignment is within 0.5 mm.
(37) The casing member **80** and the liquid crystal panel **10** are designed so that, in the case of positioning the liquid crystal panel **10** for bonding to the casing member **80** using the counter substrate **12**, the counter substrate **12** and the cover glass **31** can be bonded to the casing member **80** by the adhesive **51** as long as the misalignment between the counter substrate **12** and the casing member **80** is within 0.5 mm in plan view.
(38) For example, as illustrated in FIG. **7**, even when the counter substrate **12** and the casing member **80** are misaligned as indicated by a broken line Er**2** at the side L**1** (side L**21**), the liquid crystal panel **10** can be bonded to the casing member **80** with the adhesive **51** as long as the misalignment is within 0.5 mm.
(39) Before description of the superiority of the liquid crystal panel **10** according to the embodiment, a comparative example to the embodiment will be described.
(40) FIG. **9** is a perspective view of a configuration of a liquid crystal panel according to the comparative example, and FIG. **10** is a cross-sectional view of the liquid crystal panel taken along a Y-Z plane in FIG. **9**.
(41) As illustrated in these drawings, the liquid crystal panel **10** according to the comparative example has a configuration in which an element substrate **11**, a counter substrate **12**, and cover glasses **31** and **32** are stacked, as in the embodiment. However, in the comparative example, the cover glass **32** is slightly smaller than the counter substrate **12** in plan view. Therefore, there is a step Sp**12** between the counter substrate **12** and the cover glass **32** in a cross-sectional view. In the comparative example, the cover glass **31** is slightly smaller than the counter substrate **12** in plan view. Therefore, there is a step Sp**11** between the element substrate **11** and the cover glass **31** in a cross-sectional view.
(42) An adhesive **51** for bonding the liquid crystal panel **10** according to the comparative example to a casing member is applied to the side surfaces of the cover glass **32** and the counter substrate **12** including the step Sp**12**. In the comparative example, the adhesive **51** is applied to the side surfaces of the cover glass **31** and the element substrate **11** including the step Sp**11**. Thereafter, although not illustrated, the liquid crystal panel **10** is bonded to a casing member **80**.
(43) However, in the comparative example, the substrate becomes distorted due to contraction stress caused by curing of the adhesive **51**. This point will be described by taking the cover glass **32**, the counter substrate **12**, and the element substrate **11** as examples.
(44) FIGS. **11** to **13** are simplified cross-sectional views of the cover glass **32**, the counter substrate **12**, and the element substrate **11** with different hatchings for easy understanding of their distortions.
(45) FIG. **11** illustrates a state before application of the adhesive **51**, where no distortion occurs in the cover glass **32**, the counter substrate **12**, and the element substrate **11**.
(46) In this state, as illustrated in FIG. **10**, the adhesive **51** is applied to the side surfaces of the cover glass **32** and the counter substrate **12** including the step Sp**12**.
(47) FIG. **12** illustrates a state where the adhesive **51** is contracted. Stress as indicated by arrows in the drawing is applied to the cover glass **32** and the counter substrate **12** due to contraction of the adhesive **51** during curing.
(48) Specifically, the counter substrate **12** tends to deform as indicated by a broken line Bt with the sealing material **14** as a fulcrum due to the contraction stress of the adhesive **51**. However, the

volume of a liquid crystal **16** sealed in the gap between the element substrate **11** and the liquid crystal **16** cannot be changed and is kept constant. Therefore, the outer peripheral portion of the counter substrate **12** becomes deformed upward in the drawing due to the contraction stress of the adhesive **51**, and the central portion of the liquid crystal layer in which the liquid crystal **16** is sealed becomes deformed and convexed upward. Therefore, the counter substrate **12** becomes deformed with undulations as illustrated in the drawing.

(49) The outer peripheral portion of the cover glass **32** is pulled downward in the drawing due to the contraction stress of the adhesive **51**. Therefore, the central portion of the cover glass **32** becomes curved upward.

(50) FIG. **13** illustrates a state in which a certain period of time has elapsed after contraction of the adhesive **51**. The elastic moduli of the counter substrate **12** and the element substrate **20** are much higher than the elastic modulus of the adhesive **51**. Therefore, since the counter substrate **12** and the cover glass **31** subjected to the contraction stress of the adhesive **51** are displaced in the direction of releasing the stress, the degree of distortions of the counter substrate **12** and the cover glass **31** is reduced, but the counter substrate **12** and the cover glass **31** do not completely return to the original states.

(51) The distortions of the cover glass **32** and the counter substrate **12** have been described here. However, since the adhesive **51** is applied to the side surfaces of the cover glass **31** and the element substrate **11** including the step Sp**11**, the cover glass **31** and the element substrate **11** undergo similar distortions.

(52) As described above, in the comparative example, since the counter substrate **12** and the element substrate **11** become distorted due to the contraction stress of the adhesive **51** at the steps Sp**11** and Sp**12**, the gap between the substrates is not constant and the display quality of the liquid crystal panel **10** is degraded.

(53) When the adhesive **51** is applied so as to avoid the steps Sp**11** and Sp**12**, the amount of the adhesive **51** is reduced accordingly, and the adhesion capability of the casing member **80** is deteriorated, so that the misalignment between the casing member **80** and the liquid crystal panel **10** tends to be a problem.

(54) On the other hand, in the present embodiment, the steps Sp**11** and Sp**12** as in the comparative example are not provided, that is, the adhesive **51** is applied to the side surfaces of the cover glass **32** and the counter substrate **12** and to the side surfaces of the cover glass **31** and the element substrate **11**, in a state where these side surfaces are substantially aligned.

(55) For this reason, the contraction stress of the adhesive **51** is generated substantially in the Z direction or the opposite direction, and is hardly generated in the direction in which the substrate is warped. Therefore, in the present embodiment, since the gap between the counter substrate **12** and the element substrate **11** is kept constant, it is possible to suppress a decrease in the display quality of the liquid crystal panel **10**.

(56) The state in which the side surfaces of two or more substrates are substantially aligned with each other means that a misalignment within 0.5 mm is permitted as described above, or means that a slight misalignment to such an extent that the contraction stress of the adhesive **51** does not affect the substrates is permitted.

(57) The counter substrate **12** is an example of a first substrate, and the cover glass **32** is an example of a second substrate. The element substrate **13** is an example of a third substrate, and the cover glass **31** is an example of a fourth substrate.

(58) The adhesive **42** is an example of a first adhesive, the adhesive **51** is an example of a second adhesive, and the adhesive **41** is an example of a third adhesive. The side L**21** is an example of one side of the third substrate.

(59) Next, a projection-type display apparatus will be described as an example of an electronic device to which the liquid crystal panel **10** according to the embodiment is applied.

(60) FIG. **8** is a diagram illustrating an optical configuration of the projection-type display

apparatus **1**. As illustrated in the drawing, the projection-type display apparatus **1** includes liquid crystal panels **10**R, **10**G, and **10**B.

(61) The projection-type display apparatus **1** contains a lamp unit **2102** including a white light source such as a halogen lamp. Projection light emitted from the lamp unit **2102** is split into three primary colors of red (R), green (G), and blue (B) by three mirrors **2106** and two dichroic mirrors **2108** arranged in the projection-type display apparatus **1**. Of the light of the primary colors, light of R, light of G, and light of B are incident on the liquid crystal panel **10**R, the liquid crystal panel **10**G, and the liquid crystal panel **10**B, respectively.

(62) Since an optical path of B is longer than optical paths of R and G, it is necessary to prevent a loss in the optical path of B. Thus, a relay lens system **2121** including an incidence lens **2122**, a relay lens **2123**, and an emission lens **2124** is provided in the optical path of B.

(63) The liquid crystal panels **10**R, **10**G, and **10**B are of the same type as the liquid crystal panel **10** according to the embodiment, but they are different in the color of incident light and are distinguished by reference numerals for convenience.

(64) The liquid crystal element of the liquid crystal panel **10**R is driven based on a data signal corresponding to R supplied from the host apparatus and has a transmittance corresponding to the voltage of the data signal.

(65) Thus, in the liquid crystal panel **10**R, a transmitted image of R is generated by individually controlling the transmittance of the liquid crystal element. Similarly, in the liquid crystal panel **10**G, a transmitted image of G is generated based on a data signal corresponding to G, and in the liquid crystal panel **10**B, a transmitted image of B is generated based on a data-signal corresponding to B.

(66) The transmitted color images generated by the corresponding liquid crystal panels **10**R, **10**G, and **10**B enter a dichroic prism **2112** from three directions. At the dichroic prism **2112**, the light of R and the light of B are refracted at 90 degrees, whereas the light of G travels in a straight line. Thus, the dichroic prism **2112** combines the color images. The image combined by the dichroic prism **2112** enters a projection lens **2114**. The projection lens **2114** enlarges and projects the combined image onto a screen Scr.

(67) While the transmitted images by the liquid crystal panels **10**R and **10**B are projected after being reflected by the dichroic prism **2112**, the transmitted image by the liquid crystal panel **10**G travels in a straight line and is projected. Thus, the respective transmitted images of the liquid crystal panels **10**R and **10**B are laterally inverted with respect to the transmitted image of the liquid crystal panel **10**G.

(68) The projection-type display apparatus **1** has been exemplified here as the electronic device. However, the present disclosure is not limited to the projection-type display apparatus **1**. For example, the present disclosure can also be applied to a display panel of a head mounted display, an electronic viewfinder in a video camera, a lens-interchangeable digital camera, or the like, a display unit of a portable information terminal, a wristwatch, or the like.

(69) For example, the following aspects of the present disclosure are understood from the embodiments illustrated above.

(70) A liquid crystal panel according to one aspect (first aspect) includes a first substrate, a second substrate arranged at the first substrate with a first adhesive therebetween, a third substrate that faces a surface of the first substrate opposite to a surface at which the first adhesive is arranged and that is arranged with a liquid crystal layer therebetween, and a casing member bonded to the first substrate, the second substrate, and the third substrate via a second adhesive, in which the second adhesive is provided on side surfaces of the first substrate, the second substrate, and the third substrate, except for one side of the third substrate, and the first substrate, the second substrate, and the third substrate are arranged in a state in which the side surfaces thereof are substantially aligned in plan view except for the one side of the third substrate.

(71) According to the first aspect, deformation of the substrates of the liquid crystal panel is

suppressed, so that deterioration of display quality can be suppressed.
(72) In a specific aspect (second aspect) of the first aspect, the one side of the third substrate is a protruding portion that protrudes beyond the first substrate and the second substrate.
(73) In a more specific aspect (third aspect) of the second aspect, one end of an FPC substrate is coupled to the protruding portion.
(74) A specific aspect (fourth aspect) of the first aspect further includes a fourth substrate that faces a surface of the third substrate at a side opposite to the liquid crystal layer and is arranged via a third adhesive, in which the third substrate and the fourth substrate are arranged in a state in which side surfaces thereof are substantially aligned in plan view.
(75) In a specific aspect (fifth aspect) of the first aspect, the second adhesive bonds the side surfaces of the first substrate and the second substrate and the casing member, where a misalignment between the first substrate and the second substrate is within 0.5 mm in plan view.
(76) In a specific aspect (sixth aspect) of the first aspect, the second adhesive bonds the side surfaces of the first substrate and the second substrate and the casing member, where a misalignment between the first substrate and the second substrate is within 0.5 mm in plan view.
(77) An electronic device according to a seventh aspect includes the liquid crystal panel according to any one of the first to sixth aspects. According to the seventh aspect, it is possible to suppress deterioration in the display quality of the liquid crystal panel.

Claims

1. A liquid crystal panel comprising: a first substrate; a second substrate arranged at the first substrate with a first adhesive therebetween; a third substrate that faces a surface of the first substrate opposite to a surface at which the first adhesive is arranged and that is arranged with a liquid crystal layer therebetween; and a casing member bonded to the first substrate, the second substrate, and the third substrate via a second adhesive, wherein the second adhesive is provided at side surfaces of the first substrate, the second substrate, and the third substrate, except for one side of the third substrate, and the first substrate, the second substrate, and the third substrate are arranged in a state in which the side surfaces thereof are substantially aligned in plan view except for the one side of the third substrate.
2. The liquid crystal panel according to claim 1, wherein the one side of the third substrate is a protruding portion that protrudes beyond the first substrate and the second substrate.
3. The liquid crystal panel according to claim 2, wherein one end of an FPC substrate is coupled to the protruding portion.
4. The liquid crystal panel according to claim 1, further comprising a fourth substrate that faces a surface of the third substrate at a side opposite to the liquid crystal layer and is arranged via a third adhesive, wherein the third substrate and the fourth substrate are arranged in a state in which side surfaces thereof are substantially aligned in plan view.
5. The liquid crystal panel according to claim 1, wherein the second adhesive bonds the side surfaces of the first substrate and the second substrate and the casing member, where a misalignment between the first substrate and the second substrate is within 0.5 mm in plan view.
6. The liquid crystal panel according to claim 1, wherein the second adhesive bonds the side surfaces of the first substrate and the second substrate and the casing member, where a misalignment between the first substrate and the casing member is within 0.5 mm in plan view.
7. An electronic device comprising the liquid crystal panel according to claim 1.