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(54) **LIQUID CRYSTAL DISPLAY APPARATUS**

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(57) **ABSTRACT**

Provided is a liquid crystal display device. The liquid crystal display device includes a packaging tape assembling a liquid crystal display panel to a backlight unit. The packaging tape surrounds at least a portion of top and side surfaces of the liquid crystal display panel and a side surface of the backlight unit.

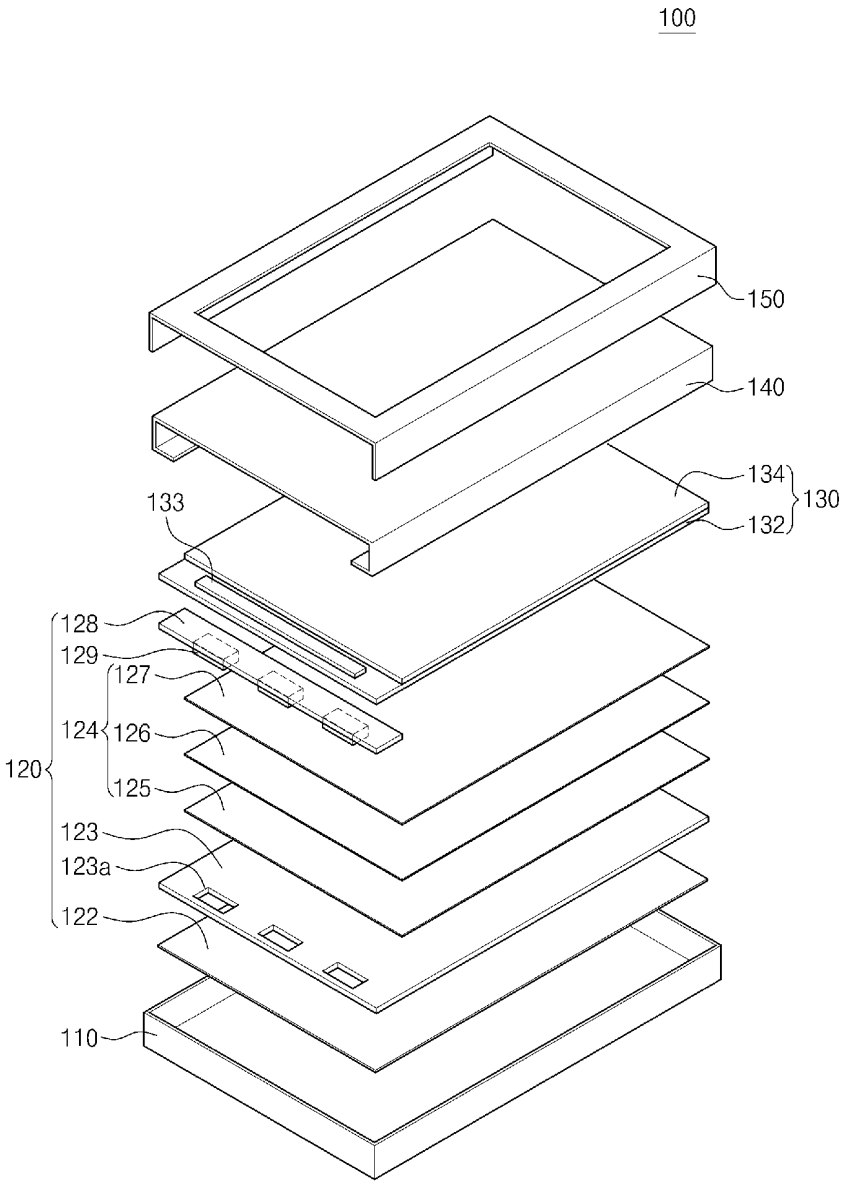


Fig. 1

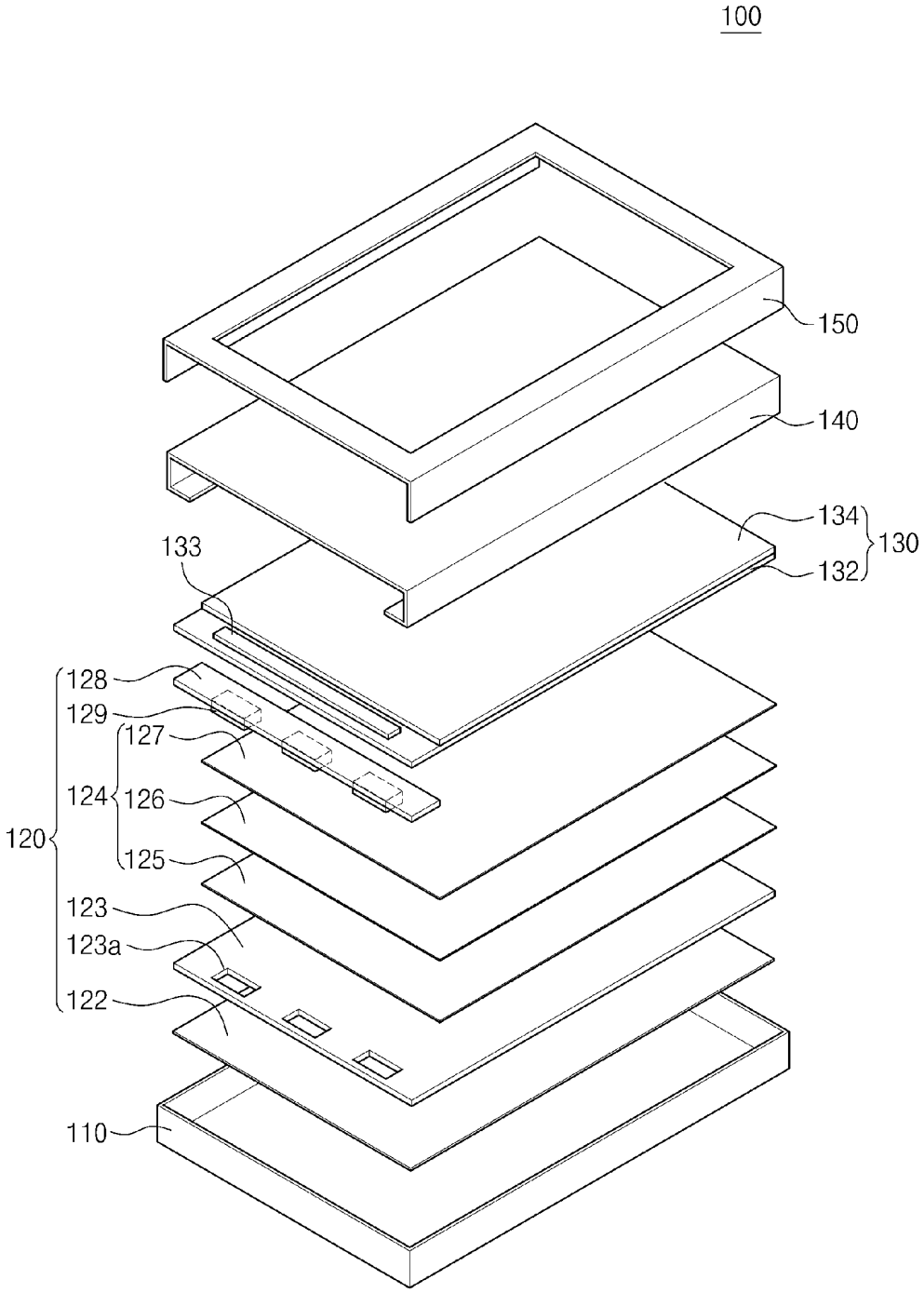

100
150
140
134
130
132
133
128
129
127
124
126
120
125
123
123a
122
110

Fig. 2A

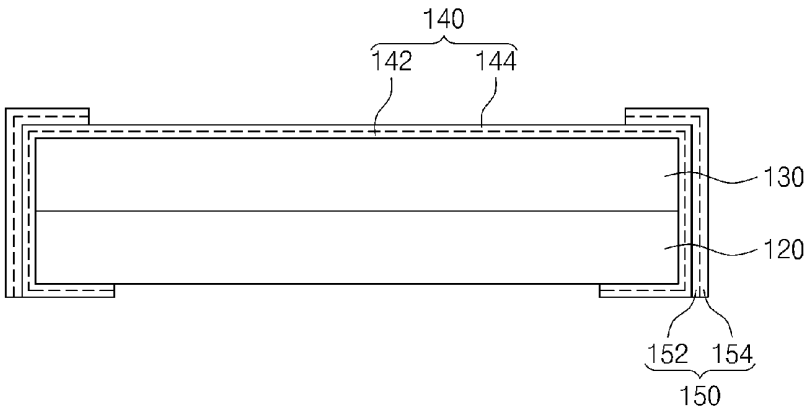


Fig. 2B

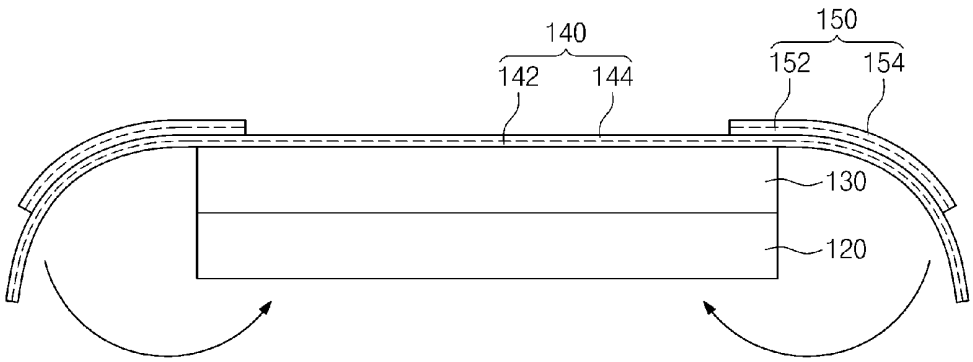


Fig. 3

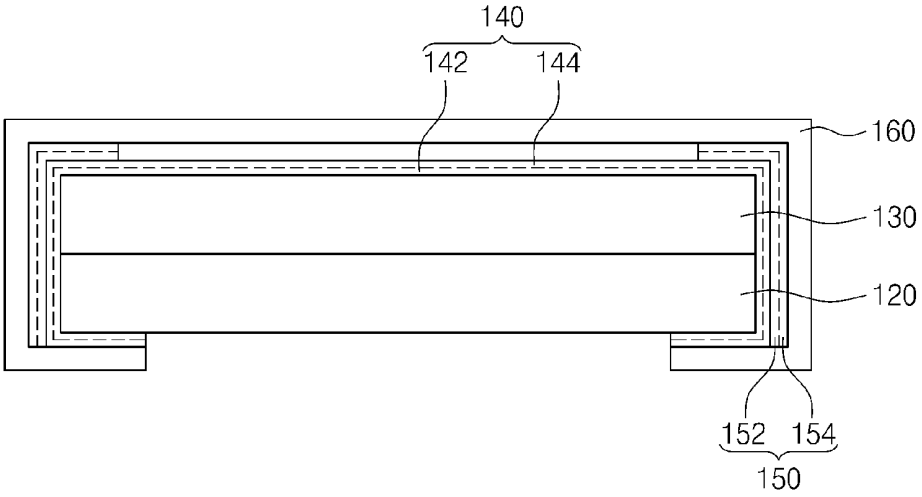

140
142
144
160
130
120
152
154
150

Fig. 4

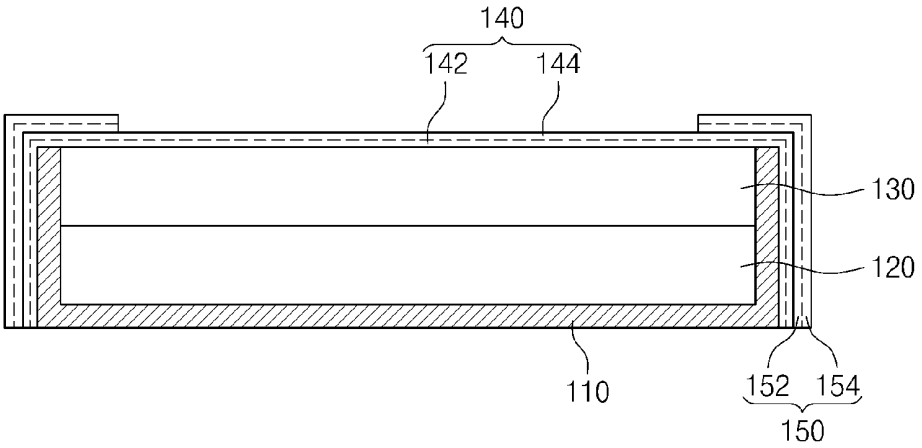
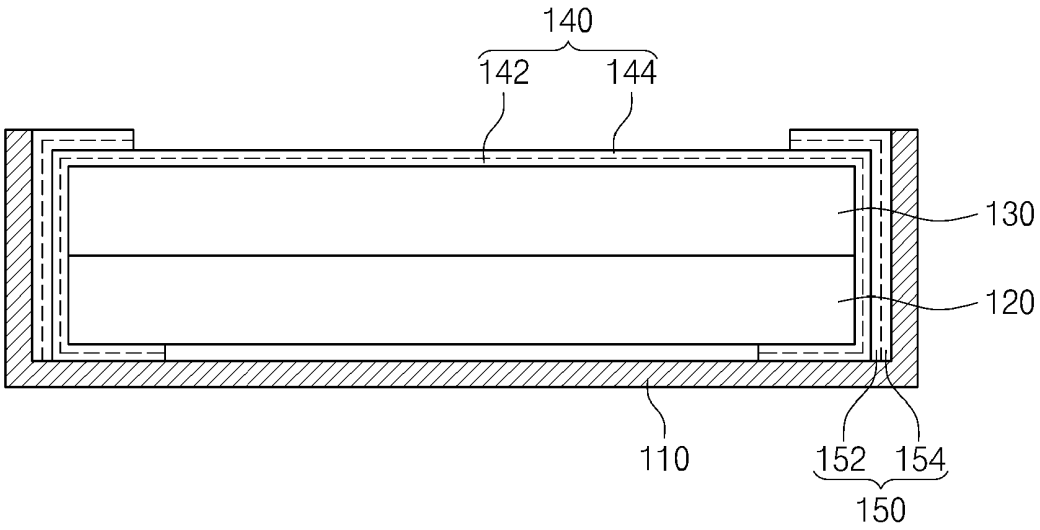

140
142
144
130
120
110
152
154
150

Fig. 5



LIQUID CRYSTAL DISPLAY APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This U.S. non-provisional patent application claims priority under 35 U.S.C. §119 of Korean Patent Application No. 10-2010-0138058, filed on Dec. 29, 2010, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] 1. Field

[0003] The present disclosure relates to a display device, and more particularly, to a liquid crystal display device.

[0004] 2. Description of the Related Technology

[0005] With the rapid development of information society, there is a demand for flat panel display devices having excellent characteristics, such as slim profile, lightweight and low power consumption. Some such flat panel displays include a liquid crystal display device or an organic light-emitting device.

[0006] The liquid crystal display device includes a backlight unit and a liquid crystal display panel. The backlight unit and the liquid crystal display panel may be assembled by a mold frame. However, when the mold frame is used, manufacturing costs of the liquid crystal display device may be increased. In addition, since the mold frame is used, the lightweight and slim profile of the liquid crystal display device may be hindered.

SUMMARY

[0007] The present disclosure provides a liquid crystal display device having a slim profile and improved strength.

[0008] Embodiments provide liquid crystal display devices including: a liquid crystal panel; a backlight unit under the liquid crystal panel; and a packaging tape assembling the liquid crystal display panel and the backlight unit, wherein the packaging tape surrounds at least a portion of top and side surfaces of the liquid crystal display panel and a side surface of the backlight unit.

[0009] In some embodiments, the packaging tape may cover the entire top surface of the liquid crystal display panel.

[0010] In other embodiments, the packaging tape may include: a first optical adhesive adhering to the liquid crystal display panel and the backlight unit; and an optical film on the first optical adhesive.

[0011] In still other embodiments, the liquid crystal display devices may further include a light shielding print part adhering to the packaging tape, the light shielding print part covering an edge of the top surface of the liquid crystal display panel.

[0012] In even other embodiments, the light shielding print part may include a white print part on the optical film, and a black print part on the white print part.

[0013] In yet other embodiments, the light shielding print part may extend from the edge of the top surface of the liquid crystal display panel to cover both side surfaces of the liquid crystal display panel.

[0014] In further embodiments, the liquid crystal display devices may further include a second optical adhesive disposed on the optical film.

[0015] In still further embodiments, the packaging tape may extend from a side surface of the backlight unit to adhere to at least portion of a rear surface of the backlight unit.

[0016] In even further embodiments, the liquid crystal display devices may further include a chassis configured to assemble the backlight unit and the liquid crystal display device.

[0017] In much further, the packaging tape may be disposed between the chassis and the backlight unit, and between the chassis and the liquid crystal display panel.

[0018] In still much further, the backlight unit may include: a light source; a light guide plate on which the light source is assembled; a reflection sheet disposed on a back surface of the light guide plate; and an optical sheet on the light guide plate.

[0019] In even much further, the light source may include a light emitting diode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings are included to provide a further understanding of the present invention, and are incorporated in and constitute a part of this specification. The drawings illustrate certain embodiments of the present invention and, together with the description, serve to explain principles of the inventive concept. In the drawings:

[0021] FIG. **1** is an exploded perspective view of an embodiment of a liquid crystal display device;

[0022] FIG. **2**A is a sectional view of an embodiment of a liquid crystal display device;

[0023] FIG. **2**B is a sectional view of an embodiment of a process in which a liquid crystal display panel and a backlight unit are assembled using a packaging tape;

[0024] FIG. **3** is a sectional view of another embodiment of a liquid crystal display device;

[0025] FIG. **4** is a sectional view of another embodiment of a liquid crystal display device; and

[0026] FIG. **5** is a sectional view of another embodiment of a liquid crystal display device.

DETAILED DESCRIPTION

[0027] Objectives, characteristics and advantages of the inventive concept will be easily understood from embodiments that will be described in detail below by reference to the attached drawings. The inventive concept may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the inventive concept to those skilled in the art.

[0028] In the specification, it will be understood that when an element is referred to as being 'on' another element or substrate, it can be directly on the other element, or intervening elements may also be present. Like reference numerals generally refer to like elements throughout.

[0029] In the specification, embodiments in the detailed description will be described with sectional views as example views. In the figures, the dimensions of layers and regions may be exaggerated for clarity of illustration. Accordingly, shapes of the example views may be modified according to manufacturing techniques and/or allowable errors. Therefore, embodiments are not limited to the specific shape illustrated in the example views, but may include other shapes that may be created according to manufacturing processes. Areas exemplified in the drawings have general properties, and are used to illustrate a specific shape of a semiconductor package region. Thus, this should not be construed as limited to the scope of the present invention. It will be understood that

although the terms first, second, and third are used herein to describe various elements, these elements should not be limited by these terms. An embodiment described and exemplified herein includes a complementary embodiment thereof.

[0030] In the following description, the technical terms are used only for explaining specific embodiments while not limiting the present invention. The terms of a singular form may include plural forms unless referred to the contrary. The meaning of "include," "comprise," "including," or "comprising," specifies a property, a region, a fixed number, a step, a process, an element and/or a component but does not exclude other properties, regions, fixed numbers, steps, processes, elements and/or components.

[0031] FIG. **1** is an exploded perspective view of an embodiment of a liquid crystal display device.

[0032] Referring to FIG. **1**, an embodiment of a liquid crystal display device **100** may include a liquid crystal display panel **130**, a backlight unit **120** disposed on a back surface of the liquid crystal display panel **130**, and a packaging tape **140** for assembling the liquid crystal display panel **130** and the backlight unit **120**. The packaging tape **140** may surround top and side surfaces of the liquid crystal display panel **130** and a side surface of the backlight unit **120**.

[0033] The liquid crystal display panel **130** may include a lower substrate **132** and an upper substrate **134**, which face each other. A liquid crystal layer (not shown) may be disposed between the lower substrate **132** and the upper substrate **134**. A polarizer (not shown) may be disposed on at least one surface of the lower substrate **132** and the upper substrate **134**. A driving chip **133** for driving the liquid crystal display panel **130** may be mounted on a side of the lower substrate. The liquid crystal display panel **130** may display corresponding information on a screen according to the operation of the liquid crystal layer.

[0034] The backlight unit **120** may have a structure which provides light for display information on the liquid crystal display panel **130**. Specifically, the backlight unit **120** may include a light source **129**, a light guide plate **123** on which the light source **129** is assembled, a reflection sheet **122** disposed under the light guide plate **123**, and an optical sheet **124** disposed on the light guide plate **123**.

[0035] The light source **129** may be mounted on a printed circuit board (PCB) **128**. The PCB **128** may be formed of a flexible material. The light source **129** may include a light emitting diode. The light source **129** may supply light required for display image information on the liquid crystal display panel **130**. In other embodiments, the light source **129** may include a fluorescent lamp, such as, for example, a cold cathode fluorescent lamp (CCFL).

[0036] The light guide plate **123** may convert point light supplied from the light source **129** into surface light. The light guide plate **123** may include grooves **123***a* in which the light source is assembled. The light guide plate **123** may be formed of a material which disperses the point light and has superior transmittance. In some embodiments, the light guide plate **123** may be formed of a material which has high strength and is not easily deformable. In some embodiments, the light guide plate **123** may be formed of poly methyl meta acrylate (PMMA).

[0037] The reflection sheet **122** is disposed under the light guide plate **123**. The reflection sheet **122** may prevent light from leaking into the back surface of the light guide plate **123**. The reflection sheet **122** may reflect light incident into the back surface of the light guide plate **123** toward the liquid crystal display panel **130**. In some embodiments, the reflection sheet **122** may be formed of polyethylen terephthalate (PET) or polycarbonate.

[0038] The optical sheet **124** may be disposed between the light guide plate **123** and the liquid crystal display panel **130**. The optical sheet **124** may include a diffusion sheet **125**, a prism sheet **126**, and a protection sheet **127**, which are sequentially stacked. The diffusion sheet **125** may disperse light emitted from the light guide plate **123**. The emitted light may be uniformly transferred onto the liquid crystal display panel **30** by the diffusion sheet **125**.

[0039] The prism sheet **126** may collect the light dispersed by the light guide plate **123** and the diffusion sheet **125** to improve light luminance. The prism sheet **126** may be provided in plurality. One of the prism sheets **126** may collect light, and the other one of the prism sheets **126** may improve collimation of light. The protection sheet **127** may prevent the optical sheet **124** from being damaged by external impacts or introduction of foreign substances.

[0040] In some embodiments, the liquid crystal display device **100** may further comprise a chassis **110** in which the backlight unit **120** and the liquid crystal display panel **130** are assembled. The chassis **110** may be formed of a metal. The chassis **110** may improve the strength of the liquid crystal display device **100**.

[0041] FIG. **2**A is a sectional view of an embodiment of a liquid crystal display device. FIG. **2**B is a sectional view of an embodiment of a process in which a liquid crystal display panel and a backlight unit are assembled using a packaging tape.

[0042] Referring to FIGS. **1**, **2**A and **2**B, the liquid crystal display panel **130** and the backlight unit **120** may be assembled using the packaging tape **140**. As shown in FIG. **2**B, the packaging tape **140** may adhere to the liquid crystal display panel **130** and the backlight unit **120** while the packaging tape **140** surrounds the crystal display panel **130** and the backlight unit **120**. In various embodiments, the packaging tape **140** may surround the top and side surfaces of the liquid crystal display panel **130** and the side surface of the backlight unit **120**; it may cover the entire top surface of the liquid crystal display panel **130**; it may extend from the side surface of the backlight unit **120** and adhere to at least one portion of an under surface of the backlight unit **120**. The packaging tape **140** may thereby improve the strength of the liquid crystal display device **100**.

[0043] In some embodiments, a light shielding print part **150** adhering on the packaging tape **140** and covering an edge of a top surface of the liquid crystal display panel **130** may be provided. The light shielding print part **150** may prevent light from leaking into a portion at which the image information is not displayed on the liquid crystal display panel **130**. The edge of the top surface of the liquid crystal display panel **130** may represent a portion at which the image information is not displayed on the liquid crystal display panel **130**. Although the light shielding print part **150** is printed on the packaging tape **140**, for convenience of description, the light shielding print part **150** may be separately illustrated in FIG. **1**.

[0044] The packaging tape **140** may include a first optical adhesive **142** adhering to the liquid crystal display panel **130** and the backlight unit **120** and an optical film **144** disposed on the first optical adhesive **142**. The optical film **144** may be formed of PET or triacetylcellulose (TAC). The first optical adhesive **142** may include a resin film having an adhesion force.

[0045] The light shielding print part **150** may be formed of substantially the same material as the optical film **144**. The light shielding print part **150** may include a white print part **152** and a black print part **154** disposed on the white print part **152**. The white print part **152** may have a white color, and the black print part **154** may have a black color. The white print part **152** may reflect against light emitted from the backlight unit **120**, and the black print part **154** may block the light passing through the white print part **152**.

[0046] The light shielding print part **150** may extend from the edge of the top surface of the liquid crystal display panel **130** to cover both side surfaces of the liquid crystal display panel **130**. In other embodiments, the light shielding print part **150** may extend from the edge of the top surface of the liquid crystal display panel **130** to cover both side surfaces of the backlight unit **120**. Thus, the light shielding print part **150** may more effectively block the light emitted from the backlight unit **120**.

[0047] Since the light shielding print part **150** is provided, a typical mold frame may be unnecessary. If the mold frame is not used, manufacturing costs of the light crystal display device may be reduced. In some embodiments, the liquid crystal display device may not include the chassis **110** of FIG. **1**. Without a chassis, the liquid crystal display device can have a lighter weight and a slimmer profile.

[0048] FIG. **3** is a sectional view of another embodiment of a liquid crystal display device. Technical descriptions duplicated with those of the foregoing embodiment described with reference to FIG. **2**A will be omitted.

[0049] Referring to FIGS. **1** and **3**, another embodiment of a liquid crystal display device may further include a second optical adhesive **160** disposed on the optical film **144**. The second optical adhesive **160** may include substantially the same material as the first optical adhesive **152**, such as, for example, the resin film. The light shielding print part **150** may be disposed between the packaging tape **140** and the second optical adhesive **160**. The second optical adhesive **160** may have an adhesion force on both side surfaces thereof. A window (not shown) or a touch screen panel (not shown) may adhere to the second optical adhesive **160**.

[0050] FIG. **4** is a sectional view of another embodiment of a liquid crystal display device. Technical descriptions duplicated with those of the foregoing embodiment described with reference to FIG. **2**A will be omitted.

[0051] Referring to FIGS. **1** and **4**, a chassis **110** in which the backlight unit **120** and the liquid crystal display panel **130** are assembled is provided. The chassis **110** may be formed of a metal material. The packaging tape **140** may surround the top and side surfaces of the liquid crystal display panel **130** and the side surface of the backlight unit **120**. The packaging tape **140** and the light shielding print part **150** may adhere to an outer surface of the chassis **110**. The liquid crystal display panel **130** may include an insulation material (not shown) on a portion contacting the chassis **110**. The insulation material helps to prevent the backlight unit **120** or the liquid crystal display panel **130** from being electrically shorted to the chassis **110**. Another embodiment of the liquid crystal display device may further include the second optical adhesive **160** of FIG. **3** on the optical film **144** of FIG. **4**.

[0052] FIG. **5** is a sectional view of another embodiment of a liquid crystal display device. Technical descriptions duplicated with those of the foregoing embodiment described with reference to FIG. **2**A will be omitted.

[0053] Referring to FIGS. **1** and **5**, a chassis **110** in which the backlight unit **120** and the liquid crystal display panel **130** are assembled is provided. The chassis **110** may be formed of a metal material. The packaging tape **140** may surround the top and side surfaces of the liquid crystal display panel **130** and the side surface of the backlight unit **120**. The packaging tape **140** may be disposed between the backlight unit **120** and the chassis **110** and between the liquid crystal display device **130** and the chassis **110**. The light shielding print part **150** may be disposed between the chassis **110** and the packaging tape **140**. The packaging tape **140** may prevent the liquid crystal display panel **130** from being electrically shorted to the chassis **110**. In other embodiments, the liquid crystal display device may further include the second optical adhesive **160** of FIG. **3** on the optical film **144** of FIG. **5**.

[0054] According to various embodiments, the packaging tape **140** may surround the entire top surface and side surface of the liquid crystal display panel **130** and the side surface of the backlight unit. Since the packaging tape is provided, the liquid crystal display panel **130** and the backlight unit **120** may be easily assembled without providing a mold frame. In addition, since the packaging tape **140** has a strong adhesion force, the strength of the liquid crystal display device may be improved.

[0055] Additionally, since the light shielding print part **150** is provided, a light leakage phenomenon through the edge of the liquid crystal display panel **130** may be minimized.

[0056] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments, which fall within the true spirit and scope of the inventive concept. Thus, to the maximum extent allowed by law, the scope of the inventive concept is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.

What is claimed is:

1. A liquid crystal display device comprising:
a liquid crystal panel;
a backlight unit disposed under the liquid crystal panel; and
a packaging tape assembling the liquid crystal display panel and the backlight unit,
wherein the packaging tape surrounds at least a portion of top and side surfaces of the liquid crystal display panel and a side surface of the backlight unit.

2. The liquid crystal display device of claim **1**, wherein the packaging tape covers the entire top surface of the liquid crystal display panel.

3. The liquid crystal display device of claim **1**, wherein the packaging tape comprises:
a first optical adhesive adhering to the liquid crystal display panel and the backlight unit; and
an optical film on the first optical adhesive.

4. The liquid crystal display device of claim **1**, further comprising a light shielding print part adhering to the packaging tape, the light shielding print part covering an edge of the top surface of the liquid crystal display panel.

5. The liquid crystal display device of claim **4**, wherein the light shielding print part comprises:
a white print part on the optical film; and
a black print part on the white print part.

6. The liquid crystal display device of claim **4**, wherein the light shielding print part extends from the edge of the top

surface of the liquid crystal display panel to cover both side surfaces of the liquid crystal display panel.

7. The liquid crystal display device of claim **3**, further comprising a second optical adhesive disposed on the optical film.

8. The liquid crystal display device of claim **1**, wherein the packaging tape extends from a side surface of the backlight unit to adhere to at least portion of a rear surface of the backlight unit.

9. The liquid crystal display device of claim **1**, further comprising a chassis configured to assemble the backlight unit and the liquid crystal display device.

10. The liquid crystal display device of claim **9**, wherein the packaging tape adheres to an outer surface of the chassis.

11. The liquid crystal display device of claim **9**, wherein the packaging tape is disposed between the chassis and the backlight unit, and between the chassis and the liquid crystal display panel.

12. The liquid crystal display device of claim **1**, wherein the backlight unit comprises:

a light source;

a light guide plate on which the light source is assembled;

a reflection sheet disposed on a back surface of the light guide plate; and

an optical sheet on the light guide plate.

13. The liquid crystal display device of claim **12**, wherein the light source comprises a light emitting diode.

* * * * *

专利名称(译)	液晶显示装置		
公开(公告)号	US20120169963A1	公开(公告)日	2012-07-05
申请号	US13/226673	申请日	2011-09-07
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星移动显示器有限公司.		
当前申请(专利权)人(译)	三星移动显示器有限公司.		
[标]发明人	PARK JEONG MIN		
发明人	PARK, JEONG MIN		
IPC分类号	G02F1/1335		
CPC分类号	G02F1/133308 G02F2202/28 G02F2202/022		
优先权	1020100138058 2010-12-29 KR		
外部链接	Espacenet USPTO		

摘要(译)

提供一种液晶显示装置。液晶显示装置包括将液晶显示面板组装到背光单元的包装带。包装带围绕液晶显示面板的顶表面和侧表面的至少一部分以及背光单元的侧表面。