US 20080297691A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2008/0297691 A1**

(43) **Pub. Date: Dec. 4, 2008**

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(54) **BACK LIGHT UNIT AND LIQUID CRYSTAL DISPLAY WITH THE SAME**

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(21) Appl. No.: **12/103,113**

(22) Filed: **Apr. 15, 2008**

(30) **Foreign Application Priority Data**

May 29, 2007 (KR) 10-2007-0051995

Publication Classification

(51) **Int. Cl.**
G02F 1/13357 (2006.01)

(52) **U.S. Cl.** **349/64**

(57) **ABSTRACT**

A back light unit for a liquid crystal display panel including a light source, a light guide plate for receiving light from the light source, a lower surface of the light guide plate coated with a reflection sheet, wherein the reflection sheet may be metal, a diffuser for diffusing the light from the light guide plate, and an optical sheet for providing the light from the diffuser to the liquid crystal display panel.

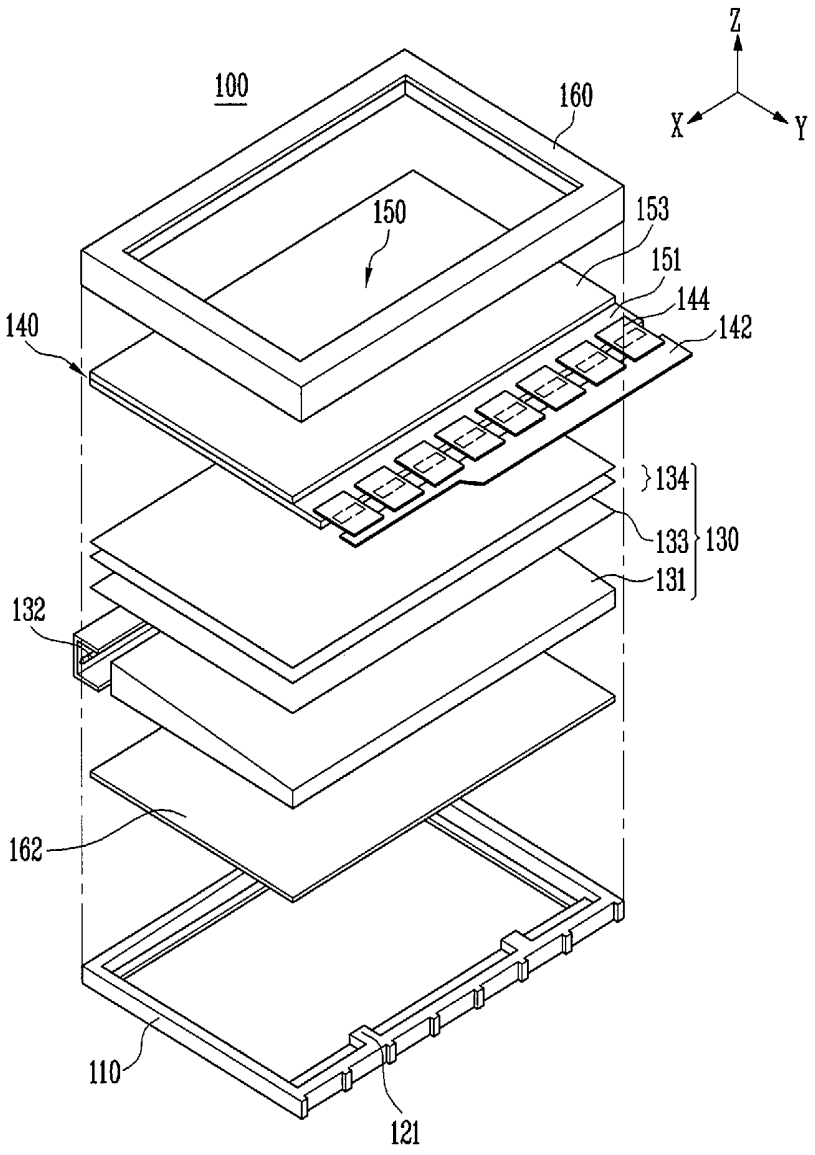

FIG. 1

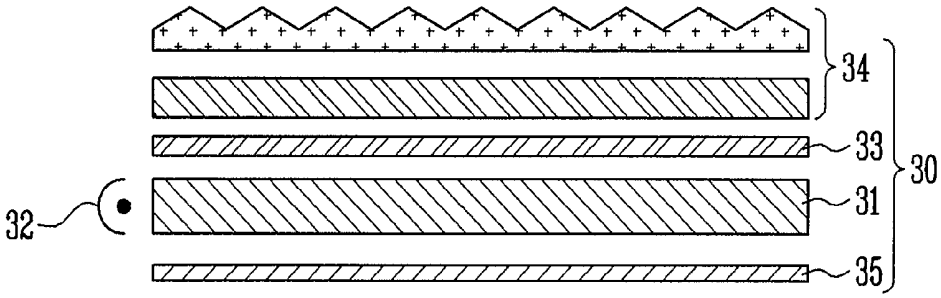

FIG. 2

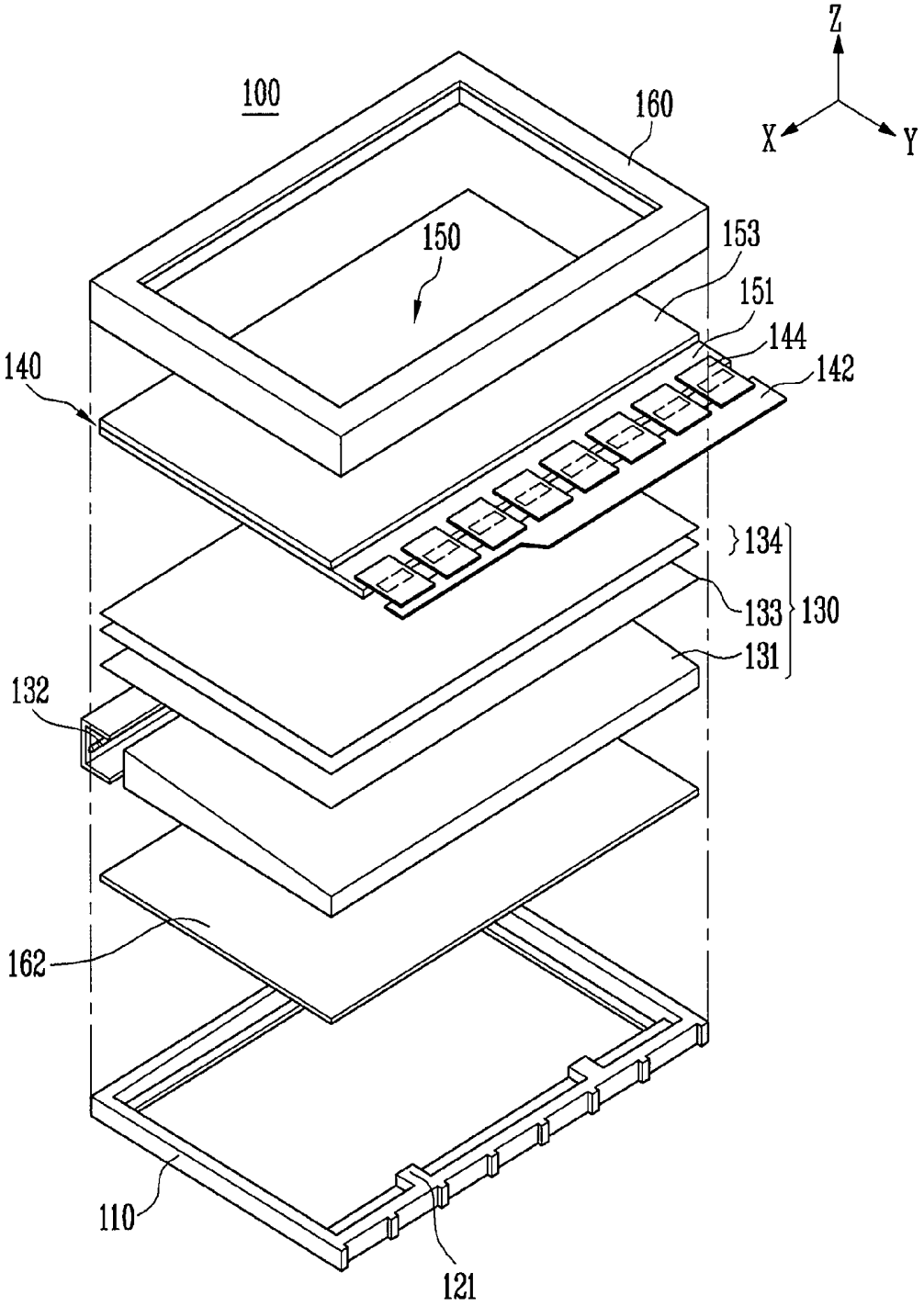
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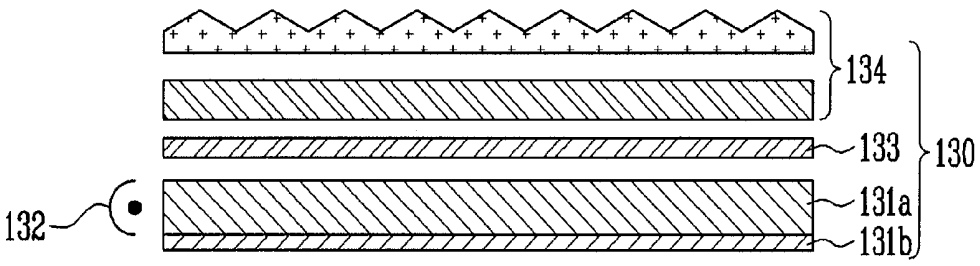
FIG. 3



BACK LIGHT UNIT AND LIQUID CRYSTAL DISPLAY WITH THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2007-0051995, filed on May 29, 2007, in the Korean Intellectual Property Office, the entire content of which is incorporated herein by reference.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates to a liquid crystal display device, and more particularly to a back light unit for a liquid crystal display device.

[0004] 2. Discussion of Related Art

[0005] With the rapid development of the information and communication industries, the use of display devices has rapidly expanded. Recently, there is demand for a display device having relatively low power, light weight, a thin profile, and high resolution. To meet such a demand, liquid crystal display devices or display devices using organic luminescence properties have been developed.

[0006] A thin film transistor-liquid crystal display (TFT-LCD) having excellent color reproduction properties and low power consumption is an example of a flat panel display device. The TFT-LCD includes a liquid crystal display panel, a back light unit, and an LCD drive IC (LDI). In the liquid crystal display panel, a liquid crystal is injected between two substrates. The back light unit is located under the liquid crystal display panel, and is used as a light source. The LDI drives the liquid crystal display panel.

[0007] In some back light units, a reflection sheet includes a dielectric substance such as a polymer compound, that complicates manufacturing of the reflection sheet. Furthermore, since a space is required between the reflection sheet and the light guide plate, a thickness of the back light unit is greater than it otherwise would be without the space.

SUMMARY OF THE INVENTION

[0008] An aspect of an embodiment of the present invention is directed toward a back light unit that can increase light efficiency by improving a reflection structure of a light guide plate, and also simplify manufacturing of a thin liquid crystal display device by making the back light unit relatively thin.

[0009] In an exemplary embodiment of the present invention, a back light unit for a liquid crystal display panel is provided to include a light source, a light guide plate for receiving light from the light source, a lower surface of the light guide plate including a reflection sheet, a diffuser for diffusing the light from the light guide plate, and an optical sheet for providing the light from the diffuser to the liquid crystal display panel. In one exemplary embodiment, the reflection sheet may be metal, such as aluminum or silver.

[0010] In one exemplary embodiment, an entire lower surface of the light guide plate may be directly coated with the reflection sheet such that there is no space between the reflection sheet and the light guide plate. Additionally, the back light unit may be incorporated into a liquid crystal display device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings, together with the specification, illustrate exemplary embodiments of the present invention, and, together with the description, serve to explain the principles of the present invention.

[0012] FIG. **1** is a schematic cross-sectional view of a structure of a general back light unit.

[0013] FIG. **2** is a schematic exploded perspective view of a liquid crystal display device according to an exemplary embodiment of the present invention.

[0014] FIG. **3** is a schematic cross-sectional view of a back light unit according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

[0015] In the following detailed description, only certain exemplary embodiments of the present invention are shown and described, by way of illustration. As those skilled in the art will recognize, the invention may be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Like reference numerals designate like elements throughout the specification.

[0016] FIG. **1** is a cross-sectional view showing a structure of a back light unit. Referring to FIG. **1**, the back light unit **30** includes a light source **32**, a light guide plate **31**, a diffuser **33**, an optical sheet **34**, and a reflection sheet **35**. The light source **32** includes a lamp and a reflection plate, the lamp being located on one side of the light guide plate **31** and the reflection plate reflecting light emitted from the lamp toward a liquid crystal display panel via the light guide plate **31**. The light guide plate **31** has a pattern, for example, a dot pattern, and serves to change a distribution of the light provided from the light source **32** to a liquid crystal display panel. The diffuser **33** diffuses the light from the light guide plate **31** to uniformly distribute the luminance of the light, and the optical sheet **34**, including a plurality of prism sheets, improves vertical incidence. For example, the optical sheet **34** may include a first prism and a second prism having V-shaped grooves thereon. The reflection sheet **35** reflects light emitted from the light source **32** to the light guide plate **31**.

[0017] With reference to FIG. **2**, a liquid crystal display device **100** includes a back light unit **130**, a liquid crystal display panel **140**, a top (or first) chassis **160**, a bottom (or second) chassis **162**, and a mold frame **110** having supports **121**. The back light unit **130** provides light to allow the liquid crystal display panel **140** to display images. The top chassis **160**, the bottom chassis **162**, and the mold frame **110** fix the back light unit **130** and the liquid crystal display panel **140**.

[0018] The back light unit **130** is supported by the bottom chassis **162** located below the back light unit, the bottom chassis **162** being fixed within the mold frame **110**. The back light unit **130** includes a light guide plate **131** for directing light emitted from a lamp. In one embodiment, the lamp is a light emitting diode (LED). However, other suitable light sources, such as a surface light source or a line light source, can be used as the lamp. A lower portion of the light guide plate **131** is coated with a reflection sheet **131***b* (FIG. **3**) for reflecting light. A plurality of optical sheets **134** are located proximate to the light guide plate **131**, each optical sheet **134**

including a first prism sheet and a second prism sheet. A diffuser **133** is formed between the light guide plate **131** and the optical sheets **134**.

[0019] The liquid crystal display panel unit **140** includes a liquid crystal display panel **150**, a printed circuit board (PCB) **142**, and a tape carrier package (TCP) **144**. The liquid crystal display panel **150** includes a TFT substrate **151** having a thin film transistor, a color filter substrate **153** on an upper portion of the TFT substrate **151**, and a liquid crystal between the TFT substrate **151** and the color filter substrate **153**. Polarizers are attached to an upper portion of the color filter substrate **153** and a lower portion of the TFT substrate **151** for determining a polarized direction of visible light emitted from the back light unit **130**.

[0020] In the TFT substrate **151**, a thin film transistor is formed on a transparent substrate in a matrix. A source of the thin film transistor is coupled to a data line, a drain of the thin film transistor coupled to a pixel electrode, and a gate of the thin film transistor is coupled to a scan line. Here, the pixel electrode includes an indium tin oxide (ITO) conductive material. A scan signal transferred through the scan line determines on/off of the TFT to transfer an electric signal from the source thereof to the drain. An arrangement of a liquid crystal is changed according to the electric signal to thereby determine the transmittance of light.

[0021] In the color filter substrate **153**, when light passes through a liquid crystal, the light passes through a color filter to indicate a specific color, and a gradation us expressed according to the transmittance of the light.

[0022] The PCB **142** transfers a data signal and a scan signal to the TFT substrate **151**, and is fixed to the TFT substrate **151** by the TCP **144**.

[0023] Referring to FIG. **3**, the back light unit **130** of an exemplary embodiment of the present invention includes a light source **132**, a light guide plate **131***a*, a diffuser **133**, and an optical sheet **134**. The light guide plate **131***a* alters light concentrated on a narrower area to be uniformly distributed through a wider area and may comprise a transparent material such as acrylic resin having a substantially rectangular shape. A lower surface of the light guide plate **131***a* is coated with a reflection sheet **131***b* including a metal such as silver or aluminum. The diffuser **133** diffuses the light from the light guide plate **131***a* to uniformly distribute the luminance of the light, and the optical sheet **134**, including a first prism sheet and a second prism sheet improves vertical incidence.

[0024] A general reflection sheet is formed of polymer material. The reflection sheet **131***b* in one exemplary embodiment of the present invention includes metal, thereby simplifying the manufacturing of the reflection sheet **131***b* as well as decreasing the cost of manufacture. Because the lower surface of the light guide plate **131***a* is directly coated with the reflection sheet **131***b*, there is no space between the light guide plate **131***a* and the reflection sheet **131***b*, thereby preventing (or reducing) a dispersion of light and increasing the light efficiency. Furthermore, the lack of a space between the light guide plate **131***a* and the reflection sheet **131** allows for a thinner liquid crystal display device.

[0025] The light source **132** includes a lamp adjacent a light guide plate. At least one LED or cold cathode tube (fluorescent lamp) may be used as the lamp. In the liquid crystal display device according an exemplary embodiment of the present invention, the reflection sheet is located at a lower surface of the light guide plate to prevent or reduce light loss. Furthermore, when the reflection sheet is composed of metal such as silver or aluminum, the manufacturing of the liquid crystal display device is simplified and the cost is reduced as compared to using a dielectric (or polymer) substance. In addition, since the reflection sheet is in direct contact with the light guide plate, there is no space between the light guide plate and the reflection sheet, allowing a thinner back light unit, and therefore a thinner liquid crystal display device.

[0026] While the present invention has been described in connection with certain exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, and equivalents thereof.

What si claimed is:

1. A back light unit, comprising:
- a light source;
- a light guide plate for receiving light from the light source, a lower surface of the light guide plate being coated with a reflection sheet;
- a diffuser for diffusing the light provided from the light guide plate; and
- an optical sheet for providing the light from the diffuser to a liquid crystal display panel.

2. The back light unit as claimed in claim **1**, wherein the reflection sheet comprises metal.

3. The back light unit as claimed in claim **1**, wherein an entire lower surface of the light guide plate is coated with the reflection sheet.

4. The black light unit as claimed in claim **1**, wherein there is no space between the reflection sheet and the light guide plate.

5. The black light unit as claimed in claim **1**, wherein the reflection sheet is in direct contact with the light guide plate.

6. A back light unit for a liquid crystal display panel comprising:
- a light source;
- a light guide plate for receiving light from the light source, a lower surface of the light guide plate comprising a metal reflection sheet;
- a diffuser for diffusing the light from the light guide plate; and
- an optical sheet for providing the light from the diffuser to the liquid crystal display panel.

7. The back light unit as claimed in claim **6**, wherein the metal reflection sheet comprises at least one of aluminum or silver.

8. The back light unit as claimed in claim **6**, wherein an entire lower surface of the light guide plate is coated with the reflection sheet.

9. The black light unit as claimed in claim **6**, wherein there is no space between the metal reflection sheet and the light guide plate.

10. The black light unit as claimed in claim **6**, wherein the metal reflection sheet is in direct contact with the light guide plate.

11. A liquid crystal display device comprising:
- a liquid crystal display panel for receiving light to display images; and
- a back light unit for providing the light to the liquid crystal display panel,
- wherein the back light unit includes:
  - a light source;
  - a light guide plate for receiving light from the light source, a lower surface of the light guide plate being coated with a reflection sheet;

a diffuser for diffusing the light from the light guide plate; and

an optical sheet for providing the light from the diffuser to the liquid crystal display panel.

12. The liquid crystal display device as claimed in claim **11**, wherein the reflection sheet comprises metal.

13. The liquid crystal display device as claimed in claim **12**, wherein the metal is aluminum.

14. The liquid crystal display device as claimed in claim **12**, wherein the metal is silver.

15. The liquid crystal display device as claimed in claim **11**, wherein an entire lower surface of the light guide plate is coated with the reflection sheet.

16. The liquid crystal display device as claimed in claim **11**, wherein there is no space between the reflection sheet and the light guide plate.

17. The liquid crystal display device as claimed in claim **11**, wherein the reflection sheet is in direct contact with the light guide plate.

* * * * *

专利名称(译)	背光单元和液晶显示器一样		
公开(公告)号	US20080297691A1	公开(公告)日	2008-12-04
申请号	US12/103113	申请日	2008-04-15
[标]申请(专利权)人(译)	KIM SHAWN 金相英国 JEON MU KYUNG 朴镇宇 李允BUM 金泰洙		
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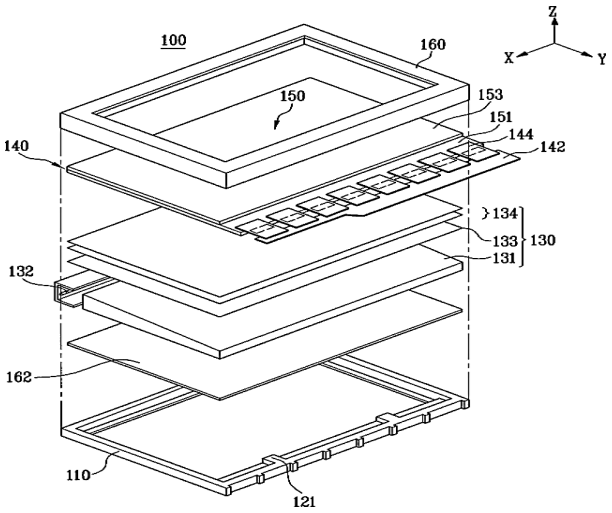
[标]发明人	KIM SHAWN KIM SANG UK JEON MU KYUNG PARK JIN WOO LEE YOUN BUM KIM TAE SOO		
发明人	KIM, SHAWN KIM, SANG-UK JEON, MU-KYUNG PARK, JIN-WOO LEE, YOUN-BUM KIM, TAE-SOO		
IPC分类号	G02F1/13357		
CPC分类号	G02B6/005 G02B6/0055 G02F1/133615		
优先权	1020070051995 2007-05-29 KR		
外部链接	Espacenet USPTO		

摘要(译)

一种用于液晶显示面板的背光单元，包括光源，用于接收来自光源的光的导光板，涂有反射片的导光板的下表面，其中反射片可以是金属，用于漫射来自导光板的光的漫射器，以及用于将来自漫射器的光提供给液晶显示板的光学片。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