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(54) BACKLIGHT UNIT AND LIQUID CRYSTAL DISPLAY COMPRISING THE SAME

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Description

Technical Field

[0001] The present invention relates to a backlight unit and a liquid crystal display using the backlight unit in which a cured resin layer takes over the function of the light guide plate, thereby thinning the backlight unit and ensuring light efficiency.

Background Art

[0002] In general, a liquid crystal display (LCD) refers to as a display device in which by separately supplying data signals according to image information to pixels arranged in a matrix type and adjusting light transmission rates of the pixels, images can be adjusted to desired images wherein since it does not self-emit light, a back light unit is arranged on a rear surface thereof to display images.

[0003] Referring to FIG. 1, in the back light unit 1, a flat-light guide plate 30 is arranged on a substrate 20 and a plurality of side view LEDs 10 (only one shown) are arranged as an array type on a side of the light guide plate 30.

[0004] In the LED 10, light L entered to the light guide plate 30 is reflected upwardly from fine reflection patterns or a reflection sheet 40 provided at a bottom of the light guide plate 30 and is emitted from the light guide plate 30 to provide back light to a LCD panel 50 disposed on a upper part of the light guide plate 30. As shown in FIG. 2,in the back light unit as described above, , a plurality of optical sheets such as a diffusion sheet 31, prism sheets 32and 33 and a protection sheet 35, etc., may be further provided between the light guide plate 30 and the LCD panel 50.

[0005] The back light unit serves to evenly emit light for displaying image on a rear surface of LCD which does not spontaneously emit light. Further, the light guide plate is a kind of plastic formation lens and serves to uniformly transfer light emitted from a light source (LED) to the entire surface of LCD for providing even luminance and lighting to the back light unit. Accordingly, this light guide plate is basically used as an essential element for the back light unit; however, there is a limitation to thinning a thickness of the back light unit due to its own thickness of the light guide plate. Specially, in a case of the back light unit of a large area, an image quality is degraded.

[0006] Further examples of back light units according to the prior art are known from US 2010/265694, US 2008/247191 and US 2006/285322.

[0007] US 2010/265694 is the closest prior art to the invention and discloses the features of the preamble of claim 1.

Disclosure of Invention

Technical Problem

[0008] The present invention has been proposed to solve the above drawbacks and an object of the present invention relates to provide a back light unit in which an essential light guide plate for a general back light unit configuration is replaced by a cured resin layer mainly consisting of an oligomer, which is used to guide light from the light source, and thereby decreasing the number of the light source, minimizing luminance variation when the unit is lighted at a high temperature, and implementing excellent heat-resistant property and optical property.

[0009] Further, another object of the present invention relates to provide a back light unit and a liquid crystal display using the back light unit in which a tensile strength, reliability of constant temperature and humidity, and heat-resistant reliability are ensured in the products and degree of freedom is increased in the back light unit by thinning entire thickness of a back light unit.

Solution to Problem

[0010] According to the present invention, a backlight is provided according to claim 1. Further embodiments of the invention are defined by the dependent claims.

[0011] A liquid crystal display may be implemented using the back light unit according to the present invention. Specially, a side view LED is used as a light source and the resin layer of the present invention laminated for receiving the light source is used as a light guide plate.

Advantageous Effects of Invention

[0012] According to the present invention, an essential light guide plate for a general back light unit configuration is replaced; and a resin layer mainly consisting of an oligomer is used to guide light from the light source, and thereby decreasing the number of the light source, minimizing luminance variation when the unit is lighted at a high temperature

and kept it for a predetermined time period, and implementing excellent heat-resistant property and optical property.

Brief Description of Drawings

[0013] The above and other aspects, features and advantages of certain exemplary embodiments of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIGS. 1 and 2 are views schematically illustrating a configuration of a back light unit according to a prior art, respectively;
FIG. 3 is a view illustrating a main configuration of a back light unit according to the present invention;
FIG. 4 is a view illustrating operational states of functions of a resin layer and beads of the back light unit according to the present invention;
FIG. 5 is an implementing example of compositions consisting of the resin layer according to the present invention;
FIGS. 6-8 are views illustrating characteristic comparison of experimental data of a resin layer according to the present invention and a resin layer formed with a general polymer;
FIG. 9(a) and FIG. 9(b) are graphs illustrating luminance changing rates of the back light unit according to the present invention and a general back light unit when they are operated at a high temperature;
FIG. 10 is a view illustrating optical patterns according to the present invention;
FIG. 11 is a view illustrating reflection patterns according to the present invention;
FIG. 12 is a view illustrating an operational state of the back light unit according to the present invention.

<Reference Numerals>

[0014]

110: printed circuit board
111: LED light source
120: reflection film
130: reflection pattern
140: resin layer
150: diffusion plate
151: optical pattern
151a: diffusion pattern
151b: light shielding pattern
160: prism sheet

Best Mode for Carrying out the Invention

[0015] Exemplary embodiments of the present invention will be described below in detail with reference to the accompanying drawings. Wherever possible, the same reference numerals will be used to refer to the same elements throughout the specification, and a duplicated description thereof will be omitted. It will be understood that although the terms "first", "second", etc. are used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another element.

[0016] A gist of the present invention relates to provide a back light unit in which a light guide plate is replaced in a prior back light unit and it is formed with a resin layer mainly consisting of an oligomer and thereby minimizing luminance variations at a high temperature and decreasing greatly a thickness of a whole back light unit and further the number of a light source.

[0017] FIG. 3 and FIG. 4 are views illustrating main constitutional elements of the back light unit according to the present invention.

[0018] Referring to FIG. 3, the back light unit according to the present invention includes a plurality of LED light sources 130 formed on a printed circuit board 110 and the resin layer 140 laminated on the printed circuit board in the structure of burying the LED light source 130. Specially, the resin layer may be formed preferably with synthetic resin comprising a synthetic oligomer.

[0019] Further, in the back light unit according to the present invention, at least one or more of LED light sources 111 are arranged on the printed circuit board 110 to emit light. In this case, the LED consists of a side view LED. That is, the light source using the side view LED is used, through which the light emitted from the LED light source 111 is not emitted right upwardly and but emitted toward side thereof.

[0020] Here, the LED is arranged in a direct-type, using the side view LED wherein the number of total light source can be decreased and total thickness of the back light unit can be decreased greatly by using the resin layer implementing light diffusion and reflection functions.

[0021] The resin layer 140 is laminated to bury the LED light source 111 and serves to diffuse light emitted sideward from the light source.

[0022] That is, a function of a prior light guide plate is performed through the resin layer 140.

[0023] FIG. 4 is a view illustrating a configuration of a back light unit as shown in FIG. 3, including beads 141. The beads may further diffuse light of the resin layer.

[0024] FIG. 5 is a table of one preferable example of a composition forming the resin layer according to the present invention.

[0025] According to an embodiment of the present invention, a resin mainly consisting of urethane acrylate oligomer (oligomer type) is used for the resin layer. For example, urethane acrylate oligomer of synthetic oligomer is used.

[0026] Of course, the resin material further comprises a monomer mixed with IBOA(isobornyl acrylate), HBA(Hydroxybutyl Acrylate) and HEMA (Hydroxy Metaethyl Acrylate) of diluted-type reactive monomer of low boiling point and may comprise a photo initiator (for example, 1-hydroxycyclohexyl phenyl-ketone, Diphenyl), Diphenyl (2,4,6-trimethylbenzoyl phosphine oxide) or antioxidants as additives.

[0027] In more detail, the resin layer may be formed with a composition comprising oligomer, monomer and additives.

[0028] In this case, the monomer is formed with a mixture of IBOA (isobornyl Acrylate) of 10-21%, HBA (Hydroxybutyl Acrylate) of 10-21% and HEMA (Hydroxy Metaethyl Acrylate) of 10-21%.

[0029] The additives may be formed by mixing the photo initiator of 1-5% to initiate a photo-reaction, or mixing the anti-oxidant of 0.5-1% to improve a yellowness phenomenon.

[0030] By forming a resin layer of UV resin using the composition as described above, instead of the light guide plate, the same effects as the light guide plate can be obtained and further a refraction rate and a thickness of the back light unit can be adjusted. At this time, all of an adhering property, reliability and mass production speed can be satisfied, using the composition as described above.

[0031] Specially, the resin layer according to the present invention may be preferably formed through the following processes.

[0032] That is, the resin layer according to the present invention may be mainly formed with urethane acrylate oligomer and be mainly-reacted in an UV curing wavelength of 300-350μm or in a wavelength of 400 μm using mercury lamp or metal (gallium) lamp, and a second low pressure curing process is performed thereto wherein N2 is inputted during the second low pressure curing process to increase a surface-adhering force and a curing rate for adjusting a curing balance and thereby the resin layer is flexible and has excellent adhering force, and overcoming a limitation of the light guide plate by keeping a refraction rate of PMMA (polymethymethacrylate).

[0033] Specially, in a case wherein nitrogen purging is not performed when the oligomer is cured, surface wrinkles and cracks may be occurred due to unbalance of internal curing and surface curing and thus it preferably allows rapid curing to be performed through the nitrogen purging even in general metal halide.

[0034] In the following, as shown in FIG. 5, the characteristics comparison of the resin layer mixed with monomer mainly consisting of oligomer according to the present invention and a resin layer made of only polymer will be described.

Mode for the Invention

1. Adhering force (tensile strength) reliability test

[0035] A tensile strength of a resin layer was tested using a thin film tensile strength tester (from Intron company of US) wherein the resin layer having a coating of an area of width X length
of 50mm X 100mm and a thickness of 1300μm was formed on upper and lower grips of the tester, and when the upper grip rose, weight loaded on a load cell was measured in and compared in real time (see FIG. 6). (test condition was 0.1m/min)

Table 1

[0036]

[Table 1]

	Present invention (Oligomer type)	Comparison example (Polymer type)
Tensile strength	10N/in^2	17N/in^2

[0037] Referring to the above test results, a tensile strength of the resin layer of the single oligomer type was lower than that of a resin layer of the polymer type, but optical characteristics such as luminance variation rate was good as will be described later.

2. Constant temperature and humidity reliability test

[0038] This test was performed using Temperature Humidity Bias (THB) and THB-SH-641 (from ESPEC company of JP) by applying a constant temperature and humidity to the resin layer and comparing constant temperature and humidity characteristics of the results therefrom. Here, test conditions were given as a temperature of 60°C and humidity of 95% for 1000 hr and then characteristics was compared. Here, as shown in FIG. 2, a reflection film was provided on the printed circuit board and the resin layer was formed on the reflection film. Further, the resin layer having a coating of an area of width X length of 115 mm X 175 mm and a thickness of 1300μm was formed on the reflection film and a test was performed under the conditions to the resin layer, and then appearance was observed and a lighting test was performed to compare the results (see FIG. 7).

Table 2

[0039]

[Table 2]

	Present invention (Oligomer type)	Comparison example (Polymer type)
Constance temperature and humidity (1000hr)	No appearance abnormalityGood adhering	Yellowness phenomenon occurred on the entire surface White phenomenon occurredNo good adhering

[0040] Referring to table 2, there was no appearance abnormality and no variation of adhering extent in the oligomer type resin layer according to the present invention, however, yellowness phenomenon was occurred on the entire surface of the polymer type resin layer having a polymer only and further the adhering property was poor.

3. Heat-resistant property reliability test

[0041] A heat-resistant property of the product was evaluated and compared by applying a predetermined amount of heat to the resin layer for a predetermined time period in an oven of HT330 (from ETAC company of JP). Here, the heat was applied at a temperature of 80°C for 240 hr and then the heat-resistant property and adhering property were compared. Further, a coating having a thickness of 1300μm and an area of width X length of 115 mm X 175 mm is formed on the reflection film and then a test was performed under the conditions to the resin layer, and then appearance was observed and a lighting test was performed to compare the results (see FIG. 8).

Table 3

[0042]

[Table 3]

	Present invention (Oligomer type)	Comparison example (Polymer type)
Constance temperature and humidity(240hr)	No appearance abnormalityGood adhering	Yellowness phenomenon occurred on the entire surface

[0043] In the above test, there was no appearance abnormality and no variation of adhering extent in the oligomer type resin layer according to the present invention, however, yellowness phenomenon was occurred on the entire surface of the polymer type resin layer having an polymer only and further the adhering property was poor.

[0044] In comparisons of the above 3 characteristics tests, the resin layer having the composition mainly consisting of the oligomer according to the present invention has been confirmed to have better tensile strength, constant temperature and humidity property, heat-resistance, reliability, and adhering property than those of the single resin layer.

4. Luminance variation test under a high temperature operation

[0045] FIG. 9 shows comparison of the experimental results of (a) the back light unit provided with the resin layer according to the present invention and (b) the back light unit provided with the polymer type resin layer for a general optics.

[0046] Specially, it is shown experimental results from that a resin layer mainly consisting of the oligomer according to the present invention and the resin layer formed of the polymer were provided to the back light configuration according to the present invention as shown in FIG. 3 wherein the back light unit light source was lighted at 60°C and left it for 1000hr in order to perform a high temperature lighting reliability test. As shown in FIG. 9, in a case of the resin layer of the polymer for general optics as a graph (b), 52% luminance decreasing rate is shown after 300hr elapses and leaves it at room temperature for 4hr, however, in a case of the back light unit provided with the resin layer according to the present invention, only 6% luminance decreasing rate is shown after 1000hr reliability lapses and leaves it at room temperature for 4hr.

[0047] It is confirmed from these experimental results that it keeps an excellent heat-resistant property and an optical property after 1000hr reliability test, comparing to the polymer type.

[0048] Referring to the configuration of the present invention as shown in FIGS. 3 and 4, the back light configuration according to the present invention, which is connected with the resin layer, will be described in detail.

[0049] In the back light unit of the present invention, a resin layer 140 may further include beads 141 for increasing light diffusion and reflection. The beads 141 may be employed in an amount of 0.01-0.3 wt% on the basis of the total weight of the resin layer. That is, light emitted sideward from LED is diffused and reflected through the resin layer 140 and the beads 141 proceeds upwardly, and in a case of providing a reflection film 120 and a reflection pattern 121, this reflection function may be accelerated. Here, one selected from a group consisting of silicon, silica, glass bubble, PMMA, urethane, Zn, Zr, Al203 and acryl may be used for the beads wherein a material for the beads may be transparent.

[0050] An existing of the resin layer may reduce greatly a thickness of a prior light guide plate and thereby thinning the product and making it flexible and applicable to a display device of a wide use.

[0051] Further, the reflection film 120 may be Ag film or white PET and may be provided with a reflection material for diffusing light emitted from the light source, and reflection patterns 121 through a whiter printing for accelerating the light diffusion. The reflection patterns may be printed using a reflection ink comprising one selected from a group consisting of TiO2, CaCO3, BaSO4, Al2O3, Silicon and PS.

[0052] Furthermore, the diffusion plate 150 may serve to diffuse light emitted through the resin layer 140 may be provided with optical patterns for implementing light shielding effect to some extent to avoid optical property being worse due to excessively strong of light intensity, or deducting yellow light. That is, the light shielding patterns may be printed using a light shielding ink in order for light not to be concentrated. Here, the optical patterns 151 may be printed on a upper or lower surface of the diffusion plate 150, and more preferably, it may be arranged in a light emission direction (front direction) from the LED light source 111 placed on a lower part of the diffusion plate. That is, the optical patterns may be on a vertical upper surface of the LED light source or a location corresponding to a light emission directional surface.

[0053] Here, the optical patterns may serve to partly shied instead of entirely shield light diffuse light and may control light shielding extent or diffusing extent as one optical pattern. Furthermore, the optical patterns may be formed as overlapped printing configuration of complex patterns.

[0054] The overlapped printing configuration refers to a configuration in which one pattern is formed and another pattern is printed over the pattern.

[0055] As one example of the overlapped printing configuration, with respect to implementing the optical pattern 151, referring to FIG. 10, a diffusion pattern 151a is formed on a lower surface of the diffusion plate in the light emission direction, using a light shielding ink comprising one or more selected from a group consisting of TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3 and Silicon, and a light shielding pattern 151b may be formed as overlapped configuration on the diffusion pattern, using the light shielding ink comprising Al or a mixture of Al and TiO_2. That is, the diffusion pattern 151a is formed on the surface of the diffusion plate by white-printing and then the light shielding pattern 151b is formed thereon, or reversely a dual configuration may be formed. Of course, it is obvious that variations of the patterns may be formed in a consideration of light efficiency, intensity and light shielding rate.

[0056] In addition, the light shielding pattern 151b of a metal layer may be formed as a middle layer among sequentially laminated configurations and then the diffusion pattern 151a may be formed on upper and lower surface of the light shielding pattern as a triple layer. In this triple configuration, the material as described in the forgoing may be used wherein as a preferable example, one of diffusion patterns may be formed using TiO_2 having excellent refraction rate and the other diffusion pattern may be formed using $CaCO_3$, having excellent light stability and color sense, together with TiO_2 and the light shielding pattern may be formed therebetween using Al shaded excellently, and thereby ensuring light efficiency and uniformity through a triple configuration. Specially, $CaCO_3$ is used for deducting an expose of yellow light and implementing white light and thereby implementing light of more stable efficiency and further in addition to $CaCO_3$, $BaSO_4$, Al_2O_3 and Silicon of inorganic material having a large particle size and similar configuration may be used.

[0057] Meanwhile, the optical pattern may be formed by adjusting pattern density in consideration of light efficiency in such manner that as it is far away from the light emission direction of the LED light source, a pattern density is lowed. Further, in the back light configuration as described in the forgoing according to the present invention, a surface treatment layer (not shown) enabling rough patterns of the optical patterns to be flat may be further provided between the resin layer 140 and the optical patterns 151 formed on the surface of the diffusion plate 150, and thereby excluding differences between a dark part and a light part which are caused from an air layer formed by a step difference occurred when the optical patterns 151 of the diffusion plate is adhered to the resin layer 140 placed on the lower part of the optical pattern wherein the surface treatment layer is formed to cover step difference of the entire optical pattern 151 as a flat layer. Additionally, the surface treatment layer may be same material as the resin layer 140 to improve an adhering property.

[0058] FIG. 11 is a plane view illustrating configurations of the reflection film and the reflection pattern according to the present invention. That is, the reflection film 120 according to the present invention may be laminated on the printed circuit board and the LED light source 111 may be exposed outside through a hole formed on the reflection film. In a case where the LED light source is formed as the side view LED, the number of the light source can be greatly decrease and further the reflection patterns 130 may be provided to greatly improve reflection rate of light for decreasing the decreasing rate number of the light source.

[0059] The reflection patterns may be formed in the light emission direction of the LED light source, as shown in an example of FIG. 11, and specially the patterns are arranged in such a manner that as the reflection patterns are far away from the light emission direction of the LED light source, pattern density thereof increases. That is, the pattern density of a second area 132 disposed farther from the light emission direction than a first area 131 is higher than that of the first area. Of course, configuration of the patterns may be varied depending on a designer's intention. Addition, the patterns may be formed through a printing method using a reflection ink comprising one of TiO_2 and Al_2O_3.

[0060] FIG. 12 is view illustrating an operational state of the back light configuration according to the present invention.

[0061] As shown in FIG. 12, the back light unit according to the present invention light is emitted sideward from the side view LED 111 and is reflected and diffused through the resin layer 140 formed instead of the prior light guide plate, and reflection rate is increases further through the reflection film 120 and the reflection pattern 130 and thereby allowing light to be guided toward a front direction. The light passing through the resin layer 140 is diffused or shielded through the optical patterns 151 formed on the diffusion plate 150 and the refined light L is entered to the LCD panel as white light through optical sheet of a prism sheet.

[0062] As described in the forgoing, in the back light unit according to the present invention, the light guide plate is replaced and light is emitted from the side view LED as light supply source, and light is guided through diffusion and reflection using a resin layer, and thereby thinning the back light unit and decreasing number of light source. Further, luminance decreasing and light uniformity problems may be supplemented through the optical patterns such as the reflection pattern, the light shielding pattern and the diffusion pattern and thereby implementing uniform image.

Claims

1. A back light unit comprising:

a plurality of side-emitting LED light sources (111) formed on a printed circuit board (110); and
a resin layer (140) which is laminated on the printed circuit board (110) and buries the LED light sources (111), wherein the resin layer (140) is arranged to provide the same effects as a light guide plate and comprises a cured synthetic resin;

characterised in that:

the synthetic resin comprises a synthetic urethane acrylate oligomer and a monomer;
wherein the urethane acrylate oligomer in the resin layer (140) has a weight percentage of 10-21 wt% on the basis of the total weight of the resin layer;
and wherein the monomer comprises a mixture consisting of IBOA, that is isobornyl acrylate, of 10-21%, HBA, that is hydroxybutyl acrylate, of 10-21% and HEMA, that is hydroxy metaethyl acrylate, of 10-21%, all amounts being weight percentages.

2. The back light unit of claim 1, wherein the resin layer further comprises additives containing a photo initiator of 1-5% and an anti-oxidant of 0.5-1% on the basis of the total weight of the resin layer.

3. The back light unit of claim 2, which further comprises a reflection film (120) laminated on the upper surface of the printed circuit board (110).

4. The back light unit of claim 3, wherein the reflection film further comprises a reflection pattern (130) for reflecting light formed on the surface of the reflection film (120).

5. The back light unit of claim 4, wherein the reflection pattern (130) is printed and comprises a reflection ink comprising one of TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3, Silicon and PS.

6. The back light unit of claim 3, wherein the back light unit further comprises a diffusion plate (150) formed on an upper surface of the resin layer (140).

7. The back light unit of claim 6, wherein the diffusion plate (150) has an optical pattern (151) printed on one main surface or the other main surface of the diffusion plate (150) for shielding or reflecting light, which shields or reflects light transmitted through the resin layer (140).

8. The back light unit of claim 7, wherein the optical pattern (151) comprises a diffusion pattern made of a light shielding ink comprising one or more materials selected from a group consisting of TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3 and Silicon, the diffusion pattern overlapping with a light shielding pattern made of a light shielding ink comprising Al or a mixture of Al and TiO_2.

9. The back light unit of one of claims 1 to 8, wherein the resin layer (140) further comprises beads (141) of 0.01-0.3 wt% on the basis of the total weight of the resin layer (140) for increasing light reflection.

10. The back light unit of claim 9, wherein the beads (141) are made up of one or more materials selected from a group comprising silicon, silica, glass bubble, PMMA, urethane, Zn, Zr, Al_20_3 and acryl.

11. A liquid crystal display comprising a back light unit according to one of claims 1-7.

12. The liquid crystal display of claim 11, which further comprises a prism sheet (160) or a protection sheet (170) laminated on an upper part of the diffusion plate (150).

Patentansprüche

1. Hintergrundbeleuchtungseinheit umfassend:

   eine Vielzahl von seitlich emittierenden LED-Lichtquellen (111), die an einer Leiterplatte (110) ausgebildet sind; und
   eine Harzschicht (140), die an der Leiterplatte (110) auflaminiert ist und die LED-Lichtquellen (111) begräbt, wobei die Harzschicht (140) dazu angeordnet ist, die gleichen Effekte wie eine Lichtführungsplatte bereitzustellen, und ein ausgehärtetes Kunstharz umfasst;
   dadurch gekennzeichnet, dass:

      das Kunstharz ein synthetisches Urethanacrylatoligomer und ein Monomer umfasst;
      wobei das Urethanacrylatoligomer in der Harzschicht (140) einen Gewichtsprozentsatz von 10-21 Gew.-% auf der Basis des Gesamtgewichts der Harzschicht aufweist;
      und wobei das Monomer ein Gemisch umfasst, das aus IBOA, das heißt Isobornylacrylat, von 10-21%, HBA, das heißt Hydroxybutylacrylat, von 10-21% und HEMA, das heißt Hydroxymetaethylacrylat, von 10-21% besteht, wobei alle Beträge Gewichtsprozentsätze sind.

2. Hintergrundbeleuchtungseinheit nach Anspruch 1, wobei die Harzschicht ferner Additive umfasst, die einen Photoinitiator von 1-5 % und ein Antioxidans von 0,5-1% auf der Basis des Gesamtsgewichts der Harzschicht enthalten.

3. Hintergrundbeleuchtungseinheit nach Anspruch 2, die ferner einen Reflexionsfilm (120) umfasst, der an der oberen Oberfläche der Leiterplatte (110) auflaminiert ist.

4. Hintergrundbeleuchtungseinheit nach Anspruch 3, wobei der Reflexionsfilm ferner ein Reflexionsmuster (130) zum Reflektieren von an der Oberfläche des Reflexionsfilms (120) gebildetem Licht umfasst.

5. Hintergrundbeleuchtungseinheit nach Anspruch 4, wobei das Reflexionsmuster (130) gedruckt ist und eine Refle-

xionstinte umfasst, die TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3, Silicium oder PS umfasst.

6. Hintergrundbeleuchtungseinheit nach Anspruch 3, wobei die Hintergrundbeleuchtungseinheit ferner eine an einer oberen Oberfläche der Harzschicht (140) gebildete Diffusionsplatte (150) umfasst.

7. Hintergrundbeleuchtungseinheit nach Anspruch 6, wobei die Diffusionsplatte (150) ein auf eine Hauptoberfläche oder die andere Hauptoberfläche der Diffusionsplatte (150) gedrucktes optisches Muster (151) zum Abschirmen oder Reflektieren von Licht aufweist, das durch die Harzschicht (140) transmittiertes Licht abschirmt oder reflektiert.

8. Hintergrundbeleuchtungseinheit nach Anspruch 7, wobei das optische Muster (151) ein aus einer Lichtabschirmungstinte bestehendes Diffusionsmuster umfasst, das eines oder mehrere Materialien umfasst, die aus einer Gruppe ausgewählt sind, die aus TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3 und Silicium besteht, wobei das Diffusionsmuster mit einem Lichtabschirmungsmuster aus einer Al oder ein Gemisch aus Al und TiO_2 umfassenden Lichtabschirmungstinte überlappt.

9. Hintergrundbeleuchtungseinheit nach einem der Ansprüche 1 bis 8, wobei die Harzschicht (140) ferner Perlen (141) von 0,01- 0,3 Gew.-% auf der Basis des Gesamtgewichts der Harzschicht (140) zum Erhöhen der Lichtreflexion umfasst.

10. Hintergrundbeleuchtungseinheit nach Anspruch 9, wobei die Perlen (141) aus einem oder mehreren Materialien bestehen, die aus einer Gruppe ausgewählt sind, die Silicium, Silica, Glassblasen, PMMA, Urethan, Zn, Zr, Al_2O_3 und Acryl umfasst.

11. Flüssigkristallanzeige umfassend eine Hintergrundbeleuchtungseinheit nach einem der Ansprüche 1-7.

12. Flüssigkristallanzeige nach Anspruch 11, die ferner eine Prismenlage (160) oder eine Schutzlage (170) umfasst, die an einem oberen Teil der Diffusionsplatte (150) auflaminiert sind.

Revendications

1. Une unité de rétro-éclairage comprenant :

   une pluralité de sources de lumière à DEL (111) à émission latérale formées sur une carte à circuit imprimé (110) ; et
   une couche de résine (140) qui est appliquée de façon laminaire sur la carte à circuit imprimé (110) et qui enchâsse les sources de lumière DEL (111), la couche de résine (140) étant agencée pour fournir les mêmes effets qu'une plaque de guidage de lumière et comprenant une résine synthétique durcie,
   caractérisé en ce que :

      la résine synthétique comprend un oligomère d'uréthane acrylate synthétique et un monomère ;
      l'oligomère d'uréthane acrylate a, dans la couche de résine (140), un pourcentage en poids de 10-21 % en poids sur la base du poids total de la couche de résine ; et
      le monomère comprenant un mélange constitué d'IBOA, c'est-à-dire d'acrylate d'isobornyle, de 10 21%, de HBA, c'est-à-dire d'acrylate d'hydroxybutyle, de 0-21% et de HEMA, c'est-à-dire d'hydroxy métaéthyl acrylate, de 10-21%, toutes ces valeurs étant en pourcentages en poids.

2. L'unité de rétro-éclairage selon la revendication 1, dans laquelle la couche de résine comprend en outre des additifs contenant un photo-initiateur à raison de 1 à 5% et un antioxydant à raison de 0,5 à 1% sur la base du poids total de la couche de résine.

3. L'unité de rétroéclairage selon la revendication 2, qui comprend en outre un film de réflexion (120) stratifié sur la surface supérieure de la carte à circuit imprimé (110).

4. L'unité de rétro-éclairage selon la revendication 3, dans laquelle le film de réflexion comprend en outre un motif de réflexion (130) pour réfléchir la lumière formée sur la surface du film de réflexion (120).

5. L'unité de rétroéclairage selon la revendication 4, dans laquelle le motif de réflexion (130) est imprimé et comprend

une encre réfléchissante comprenant l'un parmi : TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3, Silicium et PS.

6. L'unité de rétroéclairage selon la revendication 3, dans laquelle l'unité de rétroéclairage comprend en outre une plaque de diffusion (150) formée sur une surface supérieure de la couche de résine (140).

7. L'unité de rétroéclairage selon la revendication 6, dans laquelle la plaque de diffusion (150) a un motif optique (151) imprimé sur une surface principale ou l'autre surface principale de la plaque de diffusion (150) destinée à faire écran ou à réfléchir la lumière, qui fait écran ou réfléchit la lumière transmis à travers la couche de résine (140).

8. L'unité de rétroéclairage selon la revendication 7, dans laquelle le motif optique (151) comprend un motif de diffusion constitué d'une encre de protection contre la lumière comprenant un ou plusieurs matériaux choisis dans le groupe comprenant le TiO_2, $CaCO_3$, $BaSO_4$, Al_2O_3 et le silicium, le motif de diffusion étant en chevauchement avec un motif de protection contre la lumière fait d'une encre de protection contre la lumière comprenant de l'Al ou un mélange d'Al et TiO_2.

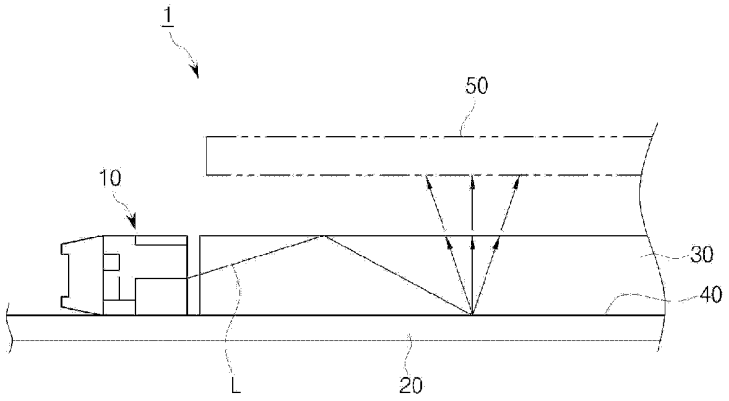
9. L'unité de rétroéclairage selon l'une des revendications 1 à 8, dans laquelle la couche de résine (140) comprend en outre des perles (141) de 0,01 à 0,3% en poids sur la base du poids total de la couche de résine (140) pour augmenter la réflexion de la lumière.

10. L'unité de rétroéclairage selon la revendication 9, dans laquelle les perles (141) sont constituées d'un ou plusieurs matériaux choisis parmi un groupe comprenant le silicium, la silice, la bulle de verre, le PMMA, l'uréthane, Zn, Zr, Al_2O_3 et acryl.

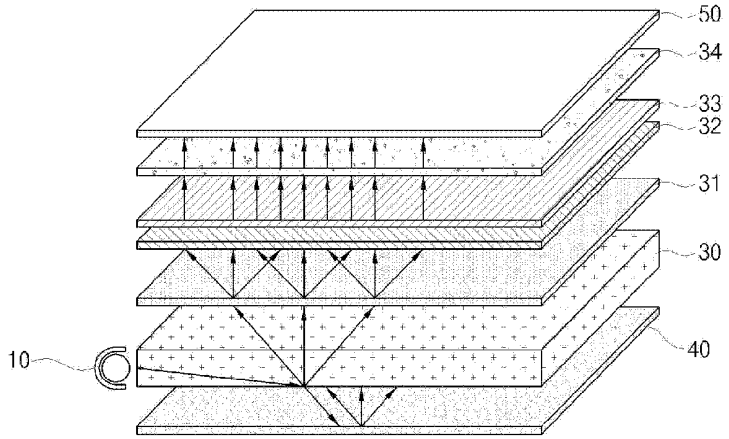
11. Un affichage à cristaux liquides comprenant une unité de rétroéclairage selon l'une des revendications 1 à 7.

12. L'affichage à cristaux liquides selon la revendication 11, qui comprend en outre une feuille (160) formant prisme ou une feuille de protection (170) appliquée de façon laminaire sur une partie supérieure de la plaque de diffusion (150).

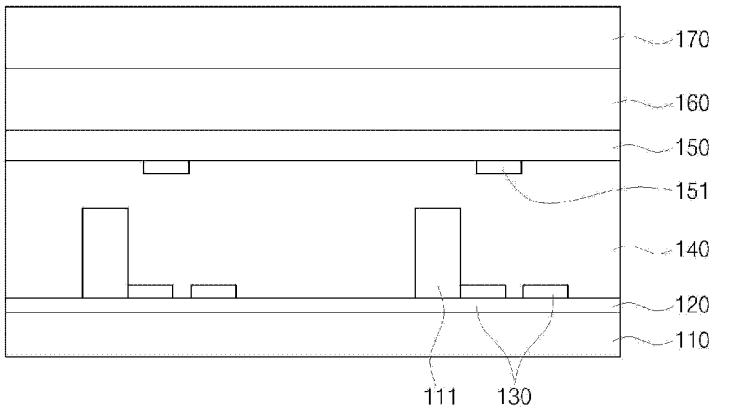
[Fig. 1]



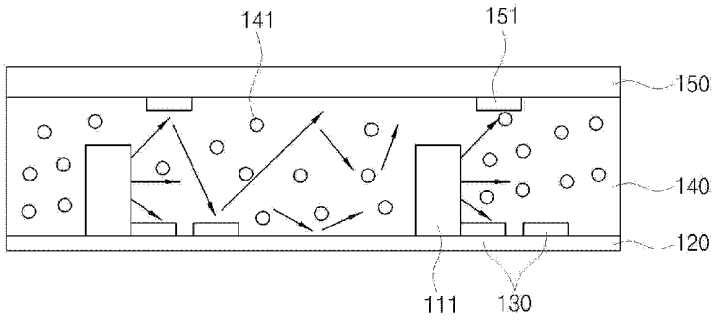
[Fig. 2]



[Fig. 3]



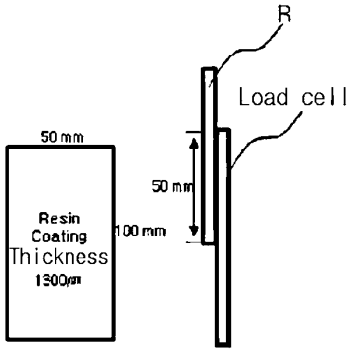
[Fig. 4]



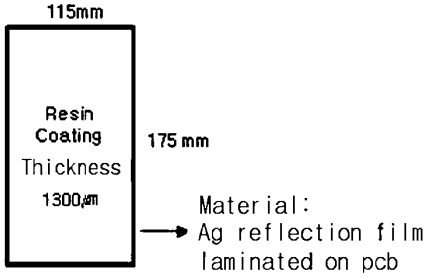
[Fig. 5]

Composition	Component	Rate(%)	Detail
RESIN	U/T acrylate oligomer	10~21	Synthetic Oligomer
			Synthetic Oligomer
MONOMER	IBOA (Isobornyl Acrylate)	10~21	Diluted-type reactive monomer of low boiling point
	HBA(Hydroxybutyl Acrylate)	10~21	Diluted-type reactive monomer of low boiling point
	HEMA (Hydroxy Metaethyl Acrylate	10~21	Diluted-type reactive monomer of low boiling point
ADDETIV	Photo initiator (1-hydroxycyclohexyl phenyl-ketone)	1~5	Photo-reactive initiator
	Diphenyl(2,4,6-trimethylbenzoyl phosphine oxide	0.5~1	Photo-reactive initiator
Summation		100%	

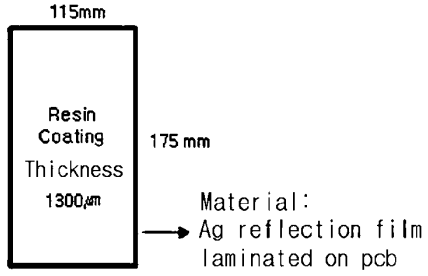
[Fig. 6]



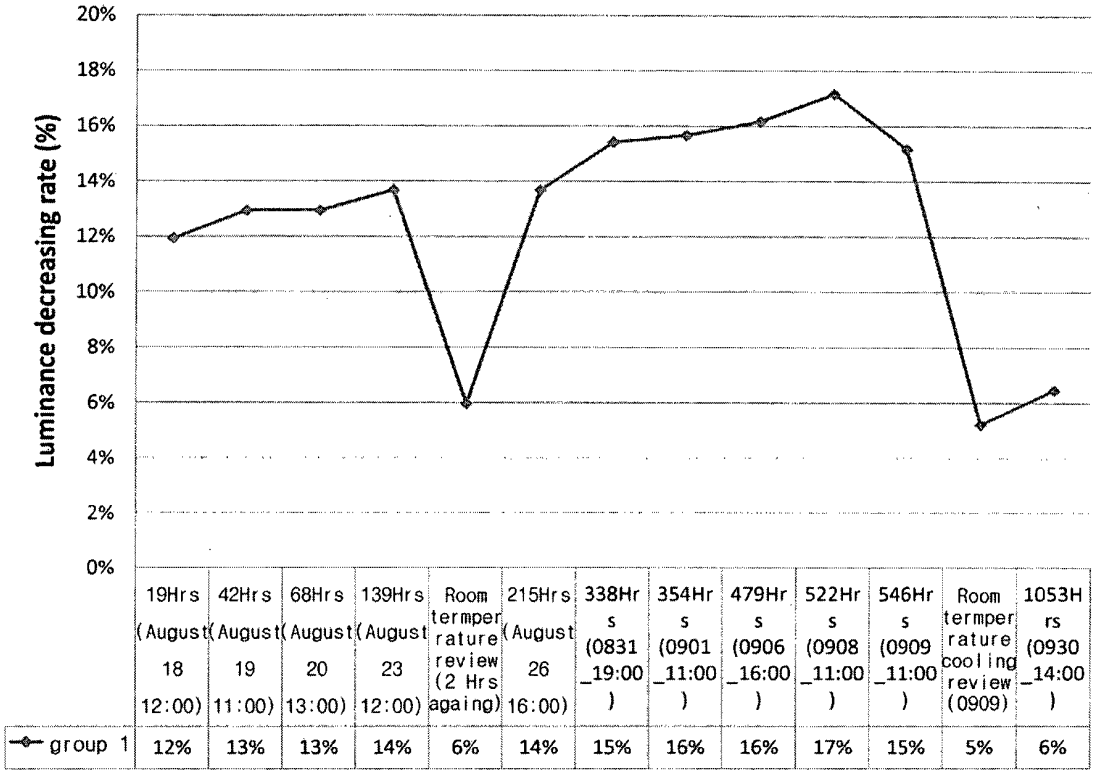
[Fig. 7]



[Fig. 8]

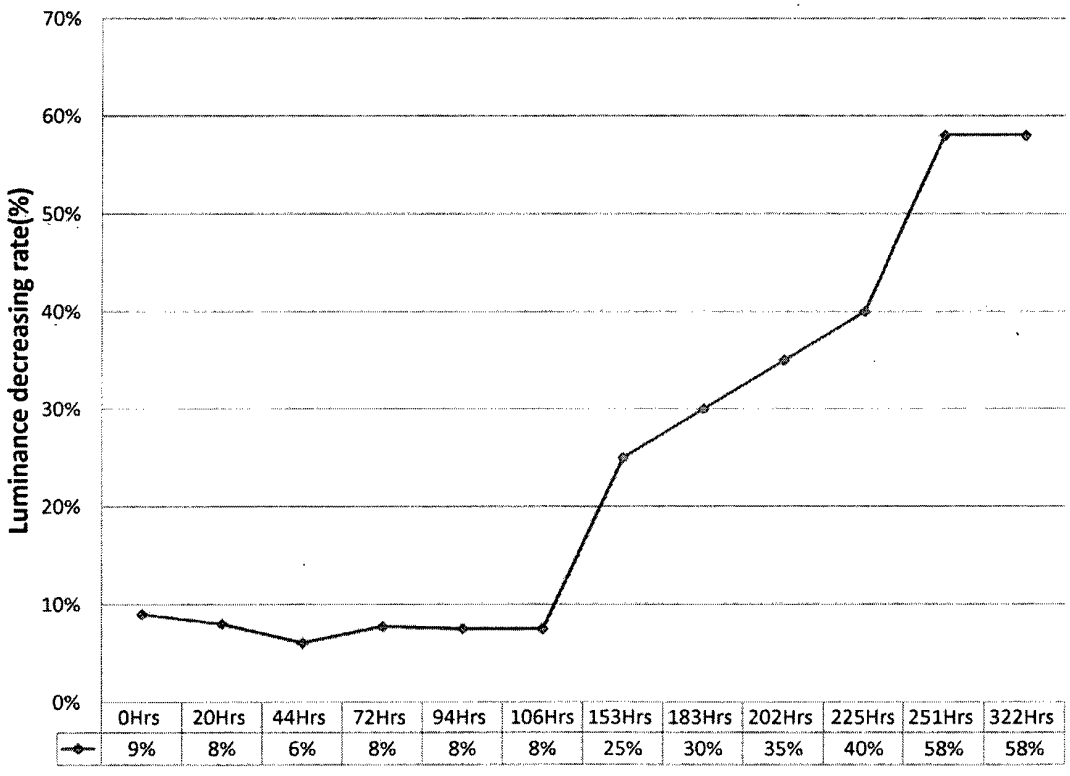


[Fig. 9]



	19Hrs (August 18 12:00)	42Hrs (August 19 11:00)	68Hrs (August 20 13:00)	139Hrs (August 23 12:00)	Room termperrature review (2 Hrs againg)	215Hrs (August 26 16:00)	338Hrs (0831_19:00)	354Hrs (0901_11:00)	479Hrs (0906_16:00)	522Hrs (0908_11:00)	546Hrs (0909_11:00)	Room termperrature cooling review (0909)	1053Hrs (0930_14:00)
group 1	12%	13%	13%	14%	6%	14%	15%	16%	16%	17%	15%	5%	6%

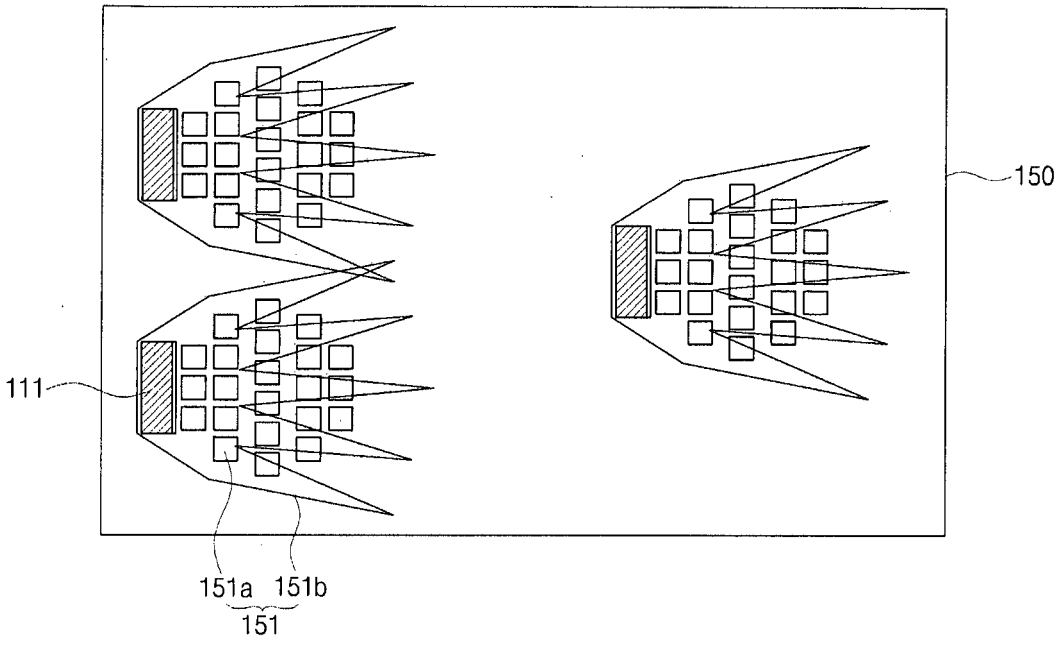
(a)



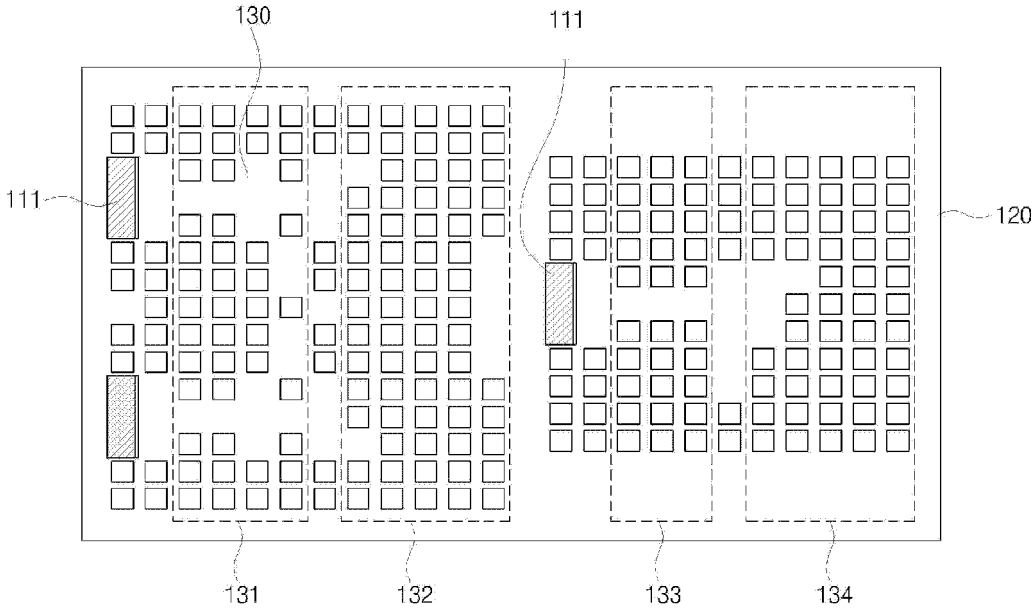
	0Hrs	20Hrs	44Hrs	72Hrs	94Hrs	106Hrs	153Hrs	183Hrs	202Hrs	225Hrs	251Hrs	322Hrs
	9%	8%	6%	8%	8%	8%	25%	30%	35%	40%	58%	58%

(b)

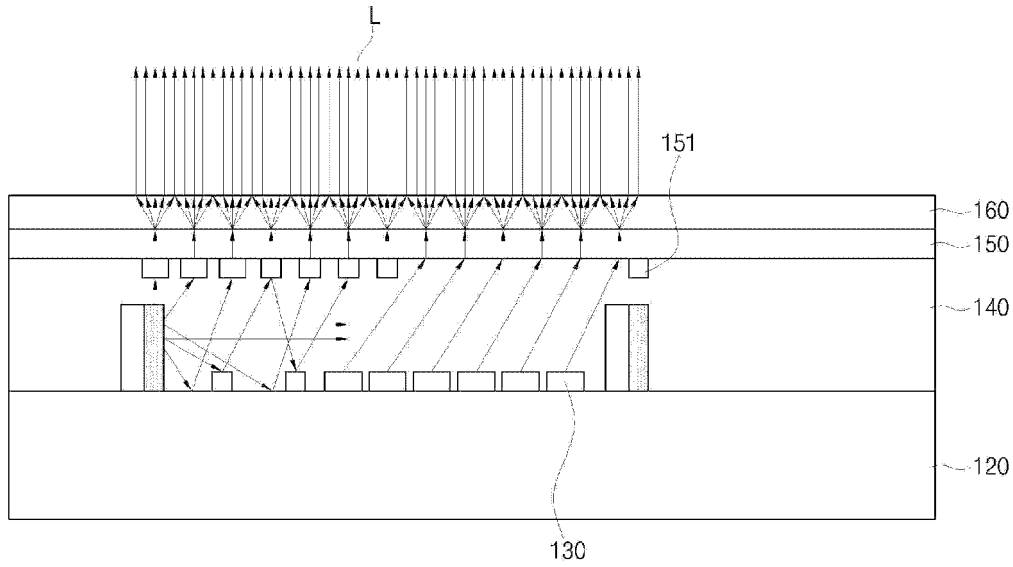
[Fig. 10]



[Fig. 11]



[Fig. 12]



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2010265694 A **[0006] [0007]**
- US 2008247191 A **[0006]**
- US 2006285322 A **[0006]**

专利名称(译)	背光单元和包括该背光单元的液晶显示器		
公开(公告)号	EP2656140B1	公开(公告)日	2018-03-21
申请号	EP2011851610	申请日	2011-08-23
[标]申请(专利权)人(译)	印诺泰克公司		
申请(专利权)人(译)	LG INNOTEK CO.，LTD.		
当前申请(专利权)人(译)	LG INNOTEK CO.，LTD.		
[标]发明人	HUR SIC PARK PENG SAM JUNG TAE OUN PARK KWANG HO PARK MOO RYONG		
发明人	HUR, SIC PARK, PENG SAM JUNG, TAE OUN PARK, KWANG HO PARK, MOO RYONG		
IPC分类号	G02F1/13357 F21V8/00 G02B6/00		
CPC分类号	G02F1/133605 G02B6/0023 G02B6/0065 G02B6/0073 G02F1/133603 G02F1/133606 G02F2202/023 G02F2202/28 Y10T428/1036 Y10T428/105		
优先权	1020100133431 2010-12-23 KR		
其他公开文献	EP2656140A1 EP2656140A4		
外部链接	Espacenet		

摘要(译)

提供一种背光单元，包括形成在印刷电路板上的多个LED光源和层压在LED光源上并向前引起发射光的漫射的树脂层，其中树脂层由包含合成树脂的合成树脂制成。低聚物。根据本发明，去除了用于一般背光单元结构的基本导光板，并且使用主要由低聚物组成的树脂层来引导光源，从而减少光源的数量，使亮度变化最小化。当该单元在高温下点亮并保持预定的时间段时，并实现优异的耐热性和光学性能。