

A LIGHT-INVERSE TYPE GUIDELIGHT PLATE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a light-inverse type guidelight plate. More particularly, the present invention relates to a light-inverse type guidelight plate with a high uniformity.

Background of the Invention

As consumable electrical goods develop, the backlight modules, which provide lighting, are broadly applied to various fields. Such as a cell phone, a notebook, a screen or a keystroke of a PDA, a Touch-pad, and even a Pointing Sticks.

Referring to Fig. 1, the conventional guidelight plate 1a is adopted for a backlight module, which has a LED (Light Emitting Diode) 5a facing a displaying region 6 of the guidelight plate 1a and disposed on an edge of a body 10a of the guidelight plate 1a. The LED 5a has a various lighting angle α depending on each plant's processing or design ability. The lighting angle α is determined and sandwiched by a first guiding path 51a and a second guiding path 52a respectively being the broadest limits. The edge of a body 10a, where the LED 5a disposed, symmetrically has two lateral side portions having no light and being dark, where each defines a dark region d, and the conventional guidelight plate 1a cannot have the light evenly transferring around therein and cannot get a high uniformity.

Hence, the prior art improved is required to overcome the disadvantages thereof.

SUMMARY OF INVENTION

The object of the invention is therefore to specify a light-inverse type

guidelight plate to meet various requirements of shapes thereof and get a high uniformity.

According to the invention, this object is achieved by a light-inverse type guidelight plate adopted for a backlight module, which has at least one lighting member, and including a reflection portion, a reflecting member partially covering the reflection portion and a light-guiding portion connecting the reflection portion for providing a displaying region. Wherein the light-guiding portion locates behind the lighting member's back, which faces the reflecting member and dispose in a slot of the reflection portion.

To provide a further understanding of the invention, the following detailed description illustrates embodiments and examples of the invention. Examples of the more important features of the invention thus have been summarized rather broadly in order that the detailed description thereof that follows may be better understood, and in order that the contributions to the art may be appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 is a perspective view of a conventional guidelight plate;

FIG. 2A is a front view of the present invention;

FIG. 2B is a side view of the present invention;

FIG. 3A is perspective view of a first embodiment of a reflection portion according to the present invention;

FIG. 3B is perspective view of a second embodiment of the reflection portion according to the present invention;

FIG. 3C is perspective view of a third embodiment of the reflection portion according to the present invention;

5 FIG. 3D is perspective view of a fourth embodiment of the reflection portion according to the present invention;

FIG. 3E is perspective view of a fifth embodiment of the reflection portion according to the present invention;

FIG. 4 is perspective view of an embodiment of a light-guiding portion
10 according to the present invention; and

FIG. 5 is perspective view of another embodiment of the light-guiding portion according to the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

15 Referring to Fig. 2A to Fig. 2B, the present invention provides a light-inverse type guidelight plate 1 is applied to a backlight module having at least one lighting member 5, the guidelight plate 1 includes at least one reflection portion 2, a reflecting member 3 covering the reflection portion 2, and a predetermined shaped light-guiding portion 4 for providing a displaying
20 region 6 formed thereon. Wherein the reflection portion 2 has at least one reflection face 21, a transmitting face 22 connecting the reflection face 21, and at least one slot 23 being concave on the transmitting face 22 and receiving the lighting member 5. The reflection face 21 is arc-shaped, or parabolic shaped to reflect light to be parallel, or the reflection face 21 is straightly lined, moreover,
25 the reflection portion 2 has a pair of the reflection faces 21 connecting to each other and including a predetermined angle sandwiched therebetween.

In addition, the lighting member 5 is a spot light source and has non-parallel light because of a lighting angle thereof. The lighting angle varies as different plants by their design and manufacturing abilities. The lighting member 5 usually is a LED, and generally speaking, the lighting angle of the LED is between 70 degree and 120 degree. The present invention provides the reflection face 21 to enlarge the region the light transfers, and provides a variable angle sandwiched between the reflection faces 21 to get various reflecting effects, so as to the light transmitting to the light-guiding portion 4 is no more limited by the lighting angle of the lighting member 5, and the light-guiding portion 4 got a high uniformity. The light-guiding portion 4 connects the transmitting face 22 of the reflection portion 2. The light-guiding portion is less than 2 mm. Wherein, the light-guiding portion 4 locates behind the lighting member 5's back, which faces the reflection face 21 of the reflecting member 3 and dispose in the slot 23 of the reflection portion 2. Whereby, the reflection face 21 reflects the light emitting from the lighting member 5 through the transmitting face 22 to the light-guiding portion 4. The reflecting member 3 covers the reflection portion 2 to reduce optical losses of the light by reflecting light, which transmits out of the reflection portion 2, back. The light-guiding portion 4 is in various shapes to connect with the reflection portion 2; accordingly, the light-guiding portion 4 with light transmitting therein and out thereof defines the displaying region 6.

In one embodiment, the light-guiding portion 4 is in a frame shape, such as a rectangular, an angulated, a circular shape, or the like to meet various requirements. See in the Fig .2A the light-guiding portion 4 is a rectangular frame, the reflecting member 3 covers a bottom, further covers a outside or further covers a inside thereof, the displaying region 6 is along the rectangular

shape. Wherein the light first emits from the lighting member 5, and passes along a first guiding path 51, which guides the light reflected once by the reflection face 21 to the light-guiding portion 4 and then reflected once by one of reflection slants 41 of the light-guiding portion 4, and a second guiding path 52 second, which guides the light reflected twice by the reflection face 21 to the light-guiding portion 4 to evenly transmit through the light-guiding portion 4. The light-guiding portion 4 includes two reflection slant 41 respectively concaved on two opposing sides of an end opposing to the reflection portion 2, the reflection slant 41 each is adjusted to get a variable depth to provide a predetermined transmitted flux therein.

With respect to Fig. 3A, the reflection portion 2 is composed of a pair reflection faces 21 and the transmitting face 22, the lighting member 5 is disposed in the slot 23, the light passes along a third guiding path 53, which guides the light reflected by one of the reflection faces 21 to the transmitting face 22, and a fourth guiding path 54, which guides the light reflected by one of the reflection faces 21 to the other and again reflected to the transmitting face 22.

With respect to Fig. 3B, the reflection portion 2 is composed of a couple of reflection face pairs 21 and the transmitting face 22, reflection face pairs 21 symmetrically connects to each other by a recess 211. The lighting member 5 emits light facing to the recess 211, the closer the recess 211 moves to the lighting member 5, the larger an incident angle of the light to the recess 211 is, so as to the light transmits more evenly.

With respect to Fig. 3C, the less the angle sandwiched between the reflection faces 21 is, the evenly the light transmits, according to the Fig 3B and 3C, the present invention can adjust the recess 211 and angle sandwiched

between the reflection faces 21 to get a even distribution of the light and a high uniformity thereof.

With respect to Fig. 3D, the reflection face 21 is shaped like a parabola, the slot 23 where the lighting member 5 disposes locates on a focus of the parabola for the light transferring parallel after reflecting by the reflection face 21.

With respect to Fig. 3E, the reflection portion 2 is reflection face is arc-shaped, accordingly, curvature adjusting is also one way to improve the uniformity thereof.

Referring to Fig. 4, the light-guiding portion 4 is in a circular shape, the lighting member 5 is disposed in the slot 23 and facing the reflection face 21, the light passes along a fifth guiding path 55, which guides the light reflected by one of the reflection faces 21 to the light-guiding portion 4, and a sixth guiding path 56, which guides the light reflected by one of the reflection faces 21 to the other and again reflected to the light-guiding portion 4, which has the circular shape.

Referring to Fig. 5, the light-guiding portion 4 is in a rectangular shape; another embodiment of the present invention includes two reflection portions 2 respectively disposed on opposing sides of the light-guiding portions 4 and two lighting members 5 respectively disposed in two slots 23 therein and obey the rule, facing the reflection face 21. The light respectively passes along a seventh guiding path 57, which guides the light reflected by one of the reflection faces 21 to the light-guiding portion 4, and a eighth guiding path 58, which guides the light reflected by one of the reflection faces 21 to the other and again reflected to the light-guiding portion 4.

The present invention uses the light-guiding portion 4 locates behind the

lighting member 5's back, which the lighting member 5 obey the rule facing the reflecting member, and dispose in the slot 23 of the reflection portion 2, so as to the light-inverse type guidelight plate 1 got a high uniformity. The present invention should be applied to not only consumable electrical goods but also
5 products for recognizing or indicating.

It should be apparent to those skilled in the art that the above description is only illustrative of specific embodiments and examples of the invention. The invention should therefore cover various modifications and variations made to the herein-described structure and operations of the invention, provided they
10 fall within the scope of the invention as defined in the following appended claims.

WHAT IS CLAIMED IS:

1. A light-inverse type guidelight plate adopted for a backlight module having at least one lighting member, and comprising:
 - at least one reflection portion having at least one reflection face, a transmitting face connecting to the reflection face, and at least one slot being concave on the transmitting face and receiving the lighting member;
 - a reflecting member covering the reflection portion; and
 - a predetermined-shaped light-guiding portion connecting the transmitting face for providing a displaying region thereon, the light guiding portion being less than 2 mm; wherein
 - the light-guiding portion locates behind the lighting member's back, which the lighting member faces the reflecting member, and dispose in the slot of the reflection portion.
2. The light-inverse type guidelight plate as the claim 1, wherein the lighting member is a LED.
3. The light-inverse type guidelight plate as the claim 1, wherein the reflection face is arc-shaped.
4. The light-inverse type guidelight plate as the claim 3, wherein the reflection portion has a pair of the reflection faces connecting to each other.
5. The light-inverse type guidelight plate as the claim 1, wherein the reflection face is straightly lined.
6. The light-inverse type guidelight plate as the claim 5, wherein the reflection portion has a pair of the reflection faces connecting to each other and including a predetermined angle sandwiched therebetween.
7. The light-inverse type guidelight plate as the claim 1, wherein the reflecting member further covers the light-guiding portion.

8. The light-inverse type guidelight plate as the claim 1, wherein the light-guiding portion is frame shaped.
9. The light-inverse type guidelight plate as the claim 8, wherein the reflecting member further covers an outside of the light-guiding portion.
- 5 10. The light-inverse type guidelight plate as the claim 9, wherein the reflecting member further covers an inside of the light-guiding portion.
11. The light-inverse type guidelight plate as the claim 8, wherein the light-guiding portion includes two reflection slant respectively concaved on two opposing sides of an end opposing to the reflection portion, the reflection
- 10 slant each is adjusted to get a variable depth to provide a predetermined transmitted flux therein.
12. The light-inverse type guidelight plate as the claim 1, wherein the light-guiding portion is plane shaped.
13. The light-inverse type guidelight plate as the claim 12, wherein the
- 15 reflection face is shaped like a parabola, the slot where the lighting member disposes locates on a focus of the parabola for the light transferring parallel after reflecting by the reflection face.