

Prism LGP White Paper

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1. Introduction

LCD market has been demanding Thinner and Brighter products as well as High Resolution and High Contrast Ratio. However, it is well-known that it is very difficult to satisfy those characteristics by the current structure of LGP at the same time because the higher the resolution is, the lower Aperture Ratio is. In addition, the thickness of LGP and the number of LGP sheets should be decreased to make products thinner, but it makes the efficiency of light lower.

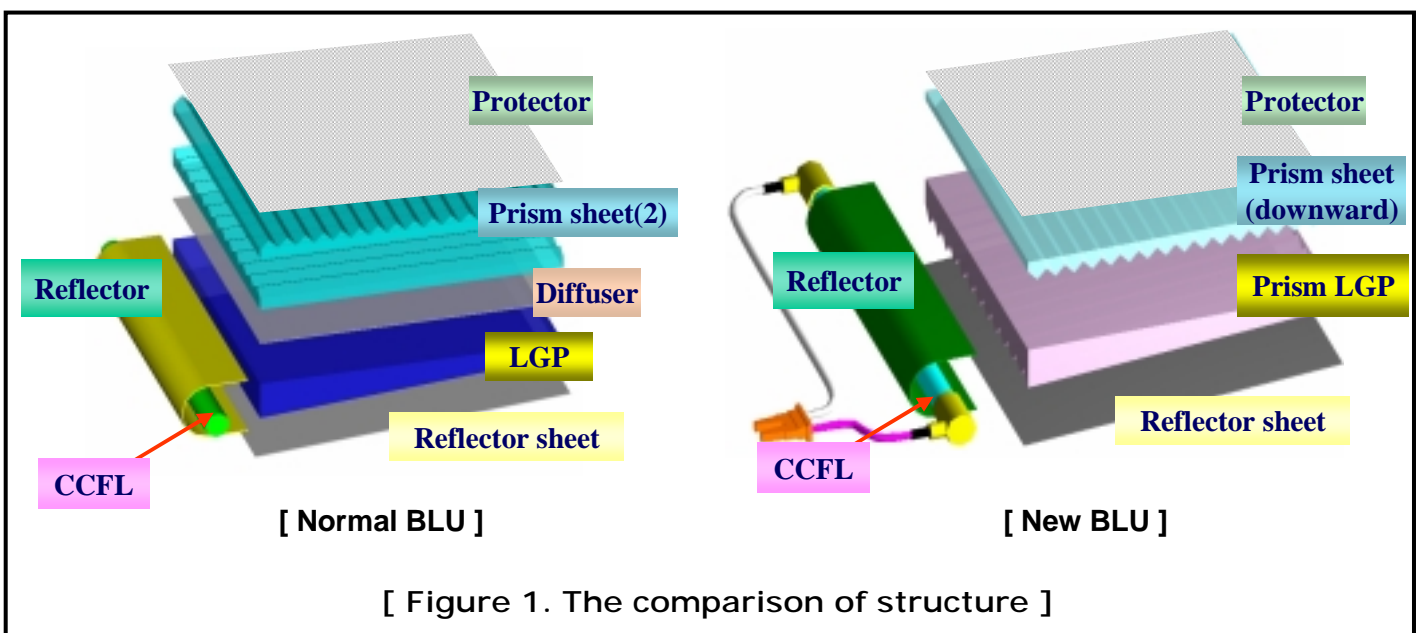
Therefore, new Back Light with Prism LGP is introduced to satisfy all the characteristics at the same time. This makes Brightness higher more than 20% by adopting condensed LGP and a prism sheet.

2. The principle of the new BLU with Prism LGP

2-1. The comparison of the structure between the normal BLU and new BLU.

The following pictures are to compare the structures between normal BLU and new BLU.

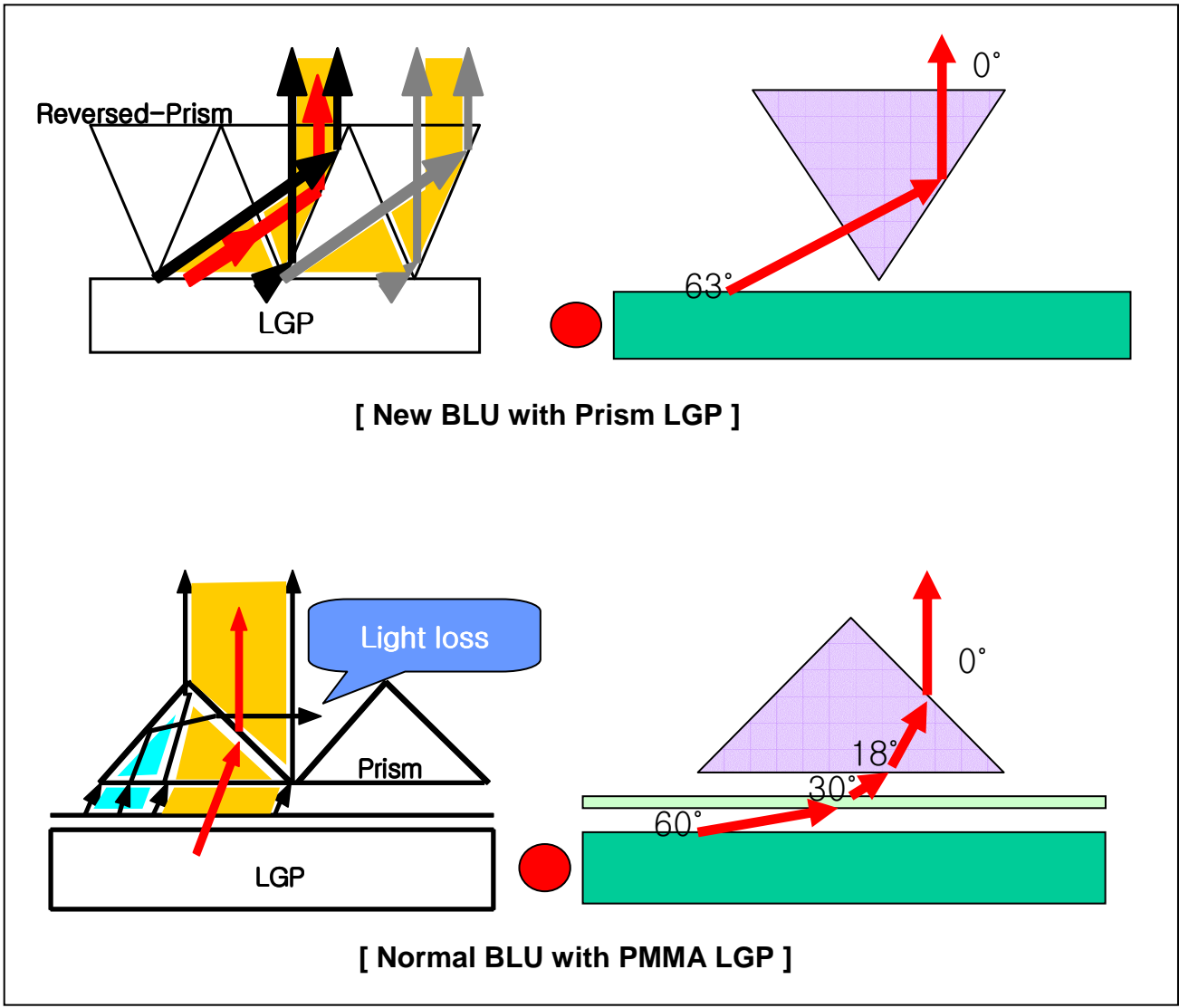
In general, the structure with 4 sheets composed of a Diffuser sheet, 2 Prism sheets and a Protector sheet on LGP has been used. However, new BLU adopts the structure with a protector and a reversed prism sheet on Prism LGP.



2-2. The way of Light's movement

The principle of Light's movement is like this.

1. The lights coming from a CCFL are gathered by Prism LGP.
2. The gathered lights are much more gathered by the specular surface of LGP Prism.
3. The condensed lights come through fine Dot-patterns on LGP, go to the reversed-prism sheet by about 63° and are reflected to the perpendicular direction as the following figure (Refer to next page!)
4. By doing so, light loss, compared with Normal BLU, can be decreased.

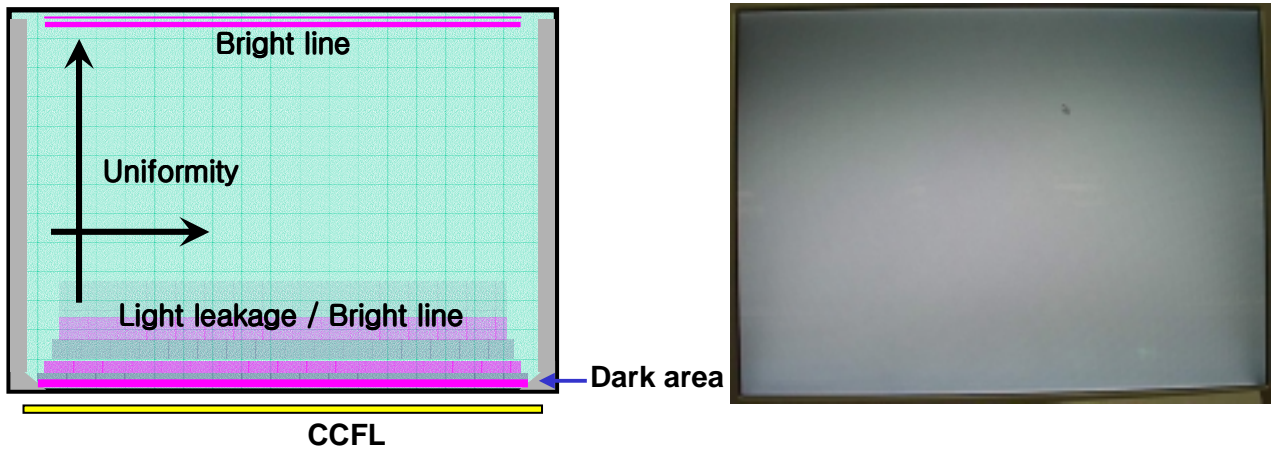


[Figure 2. The way of lights' movement]

3. The issue on Prism LGP

When Prism LGP is used, the following issues are anticipated as the figure 2.

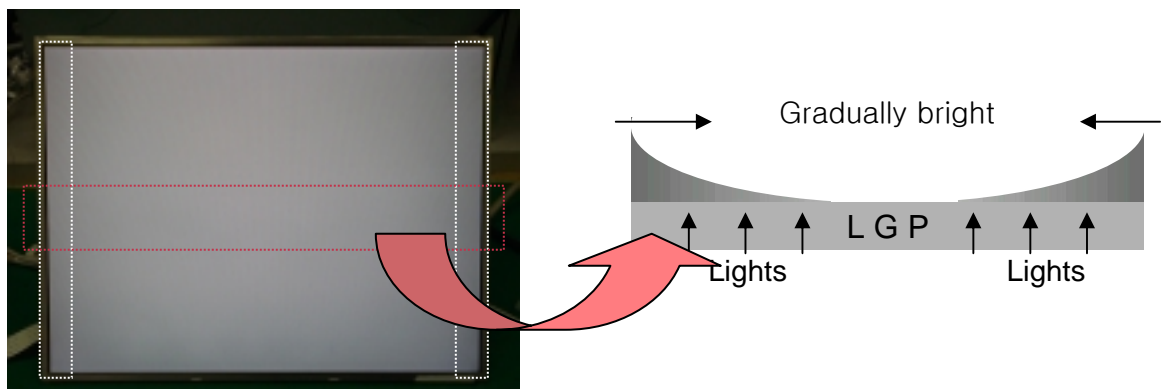
They result from the facts that the lights from a CCFL have the difficulty spreading everywhere evenly in Prism LGP since the slant-shaped Prism in LGP gathers lights to certain points. Moreover, it is difficult to scatter the concentrated lights to all the parts of LGP uniformly.



[Figure 3. Issues on Prism LGP]

3-1. Uniformity

Lights in Prism LGP are difficult to be spread all over LGP because their characteristic to go straight is stronger than LGP's characteristic to diffuse lights in Prism LGP. Accordingly, the quantity of lights is always insufficient at both side of LGP, so that both sides of a panel can be shown dimly a little bit, compared with other parts. (Refer to the following picture!). Consequently, "Uniformity" comes to be lower at the panel with Prism LGP than with PMMA LGP.



[Figure 4. Dark area]

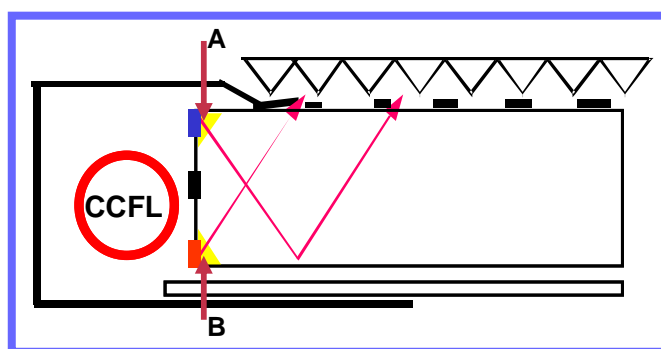
In reference,

	PMMA LGP	Prism LGP
Uniformity (5 points / 13 points)	Min 80% / 65%	Min 75% / 45%

1. Human being's eyes recognize the uniformity in Prism LGP is much better than that in PMMA LGP since Uniformity in Prism LGP is changed gradually. That is, the numerical data is not closely associated with the real uniformity recognized by eyes.
2. Numerically, Competitor's BLU with Prism LGP satisfies min 60% at 13 points. However, Uniformity looks very bad due to the bright lines both on top and at the bottom of the active area.
3. "Uniformity variation" in Prism LGP is very small. Thus, there is no difference in the level of Uniformity between development stage and mass-production stage.

3-2. Bright line at the bottom of the active area

Bright line can be detected at the bottom area of a panel near CCFL. One of the reasons is that the lights from a CCFL are concentrated at the corners indicated as A and B as the following figure 5. Then, they go out according to the red arrows. In this case, the lights assume the form of bright band. This is called "Bright line".



[Figure 5. Bright line]

3-3. Bright line on top of the active area

As mentioned above, lights tend to not diffuse throughout LGP but go straight to the opposite edge of the edge near CCFL since there is not any Dot pattern in Prism LGP. The lights reaching the opposite side are reflected from Mold Frame, which makes the bright line at the upper position of the active area.

4. Conclusion

In brief, adopting Prism LGP can satisfy not only high resolution and high contrast ratio but also higher brightness and thinner products. The uniformity is low numerically but the real uniformity felt by eyes is very good. In conclusion, your company is encouraged to accept SEC's specification of min 45% and 75% at 13 points and 5 points, respectively.