

LED Backlight with Special FOV for Automobile

Feng Qibin¹, Yin Huijuan¹, Shi Zuchuan², Feng Qigang², Li Dejun², Fang Xudong² and Lv Guoqiang¹

¹Hefei University of Technology Key Lab of Special Display Technology, Ministry of Education; National Engineering Lab of Special Display Technology; National Key Lab of Advanced Display Technology; Academy of Photoelectric Technology, Hefei 230009, China

Tel.:86-551-62904028, E-mail: guoqianglv@hfut.edu.cn

²Hefei BOE Display Lighting Co.,Ltd, Hefei 230011, China

The LCDs (Liquid crystal displays, LCDs) used in automobile have to present wide field of viewing (FOV), which cause the cost increase. Different from LCDs in common life, it would be beneficial for the LCDs in automobile to have the high luminance at the viewing angle of horizontal 0° and vertical 20° to make the emitting lights from LCDs as most efficient as possible. To realize the special FOV, the paper designs a kind of optical film with micro-structure on the front side to direct the most lights to the required angle.

The not-imaging optical theory is applied to design the micro-structure on the film. The simulation model and result are shown in the Figure 1. It can be seen that the horizontal angle curve is symmetrical about the normal direction with the highest luminance at the angle of 0° . While the highest luminance of the vertical angle viewing curve happens at the 22° , satisfying the FOV requirement. The designed film is manufactured and the LED backlight prototype with such film is developed. The practical viewing angle curve is measured by ELDIM, shown in the Figure 2.

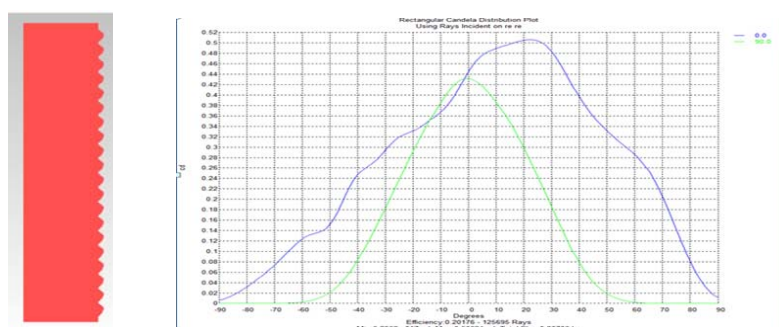


Fig. 1. The simulation model and result of the backlight with special FOV

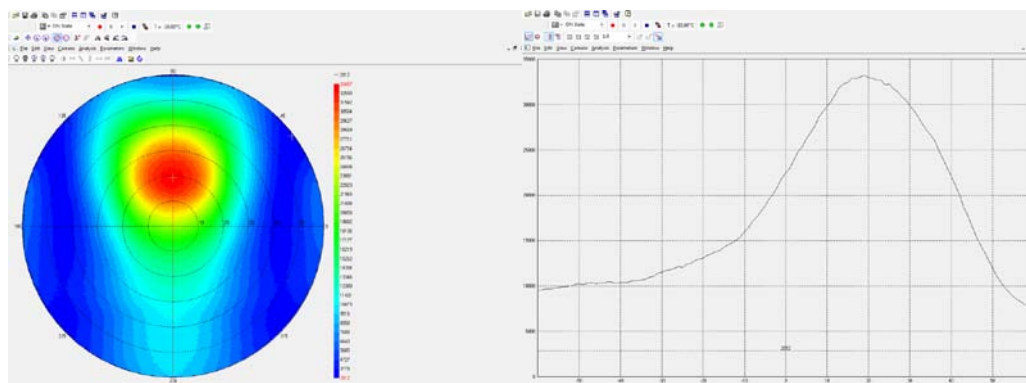


Fig. 2. The measurement result of the backlight with special FOV

Acknowledgment

This work was supported by the National Science Foundation of Anhui Province (Grant No: 1408085MKL86).

References

1. K. Mahdi, J. Niemczyk. Dual Redundant Display in Bubble Canopy Applications, Proc. Of Three-Dimensional Imaging, Visualization, and Display 2010 and Display Technologies and Applications for

- Defense, Security, and Avionics, 7690(2010).
2. J. N. Vizgaitis, Alexandria., Simultaneous dual band FOV imaging system, US Patent no. 8563929B2 (2013).
 3. J. B. Leng. Controlled view angle display, master thesis, University of electronic science and technology of China, 2010.