Improving Peripheral Light Leakage of Ultra Narrow Bezel Displays by Altering Position and Height of Dummy Seal

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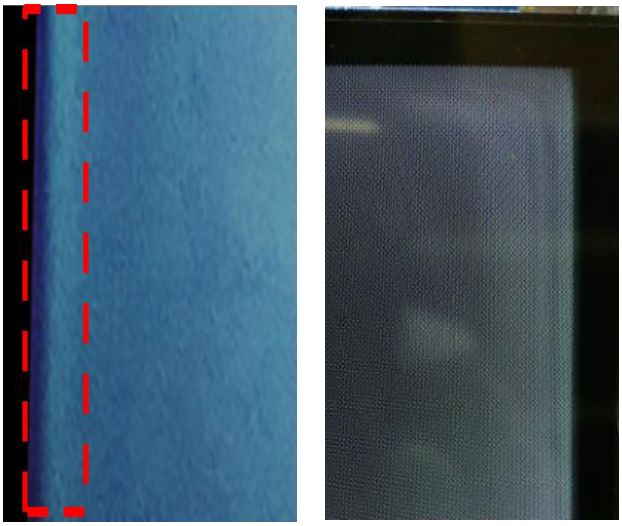
Abstract:

This paper mainly describes several feasible ways to improve peripheral light leakage of ultra narrow bezel displays by altering position and height of dummy seal.

1 Background

With the increasing demand for perspective, brightness and contrast of high-level ultra narrow bezel displays in the market, and the problem of peripheral light leakage which hasn't been well solved for a long time, it is urgent to overcome this challenge. We find out several ways to remarkably improve peripheral light leakage by *altering position and height of dummy seal*.



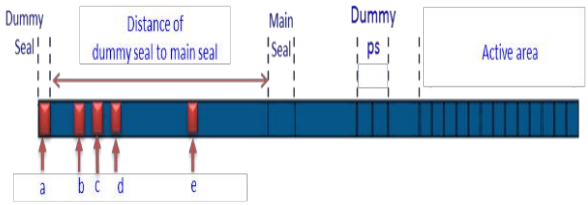
a b

Picture1. Two examples of peripheral light leakage

2 Improve light leakage of ultra narrow bezel displays

After a long time of observation, we discover the gap difference between dummy area and active area is one of primarily reasons, which result in peripheral light leakage. So we want to improve peripheral light leakage of ultra narrow bezel displays by reducing the gap difference between dummy area and active area.

First of all, we change the distance of dummy seal to main seal. In our study, we set five positions of dummy seal with different distance to main seal. In figure 1, we take average cell gap of active area as 0 to measure gap difference from dummy area to active area. In addition, Y-axis represents the position of measure points and X-axis represents gap difference between dummy seal and active area. By comparing the results, we discover the distance between dummy seal and main seal remarkably influences gap difference between dummy area and active area. In short, the distance is nearer, the Δ Cell Gap is smaller, so peripheral light leakage is weaker, to a certain extend.



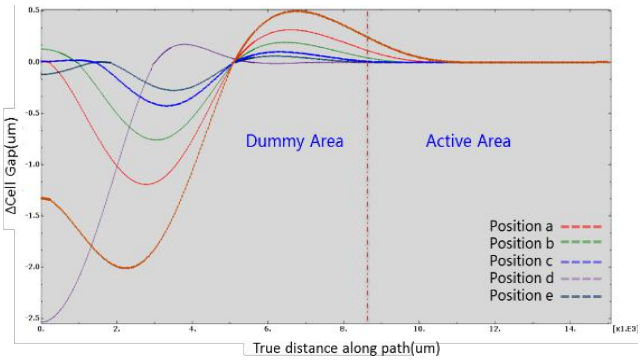
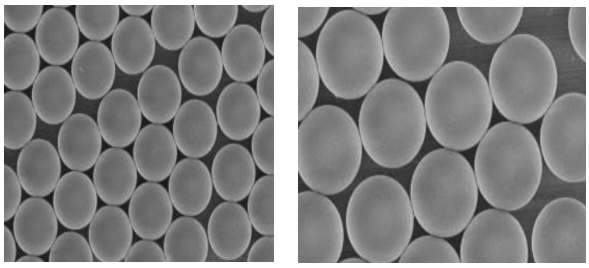


Figure1. Changing position of dummy seal

Secondly, we change height of dummy seal by changing the size of spacer, which is filled in dummy seal, to research the relationship between height of dummy seal and peripheral light leakage. In our research, we set two different spacer sizes. Spacer b is slightly bigger than spacer a. We find the gap difference, which using spacer with size b, is smaller. It means when spacer is appropriate bigger, the gap difference between dummy area and active area is smaller (figure 2). So we conjecture that increasing the intensity of supporting strength of dummy seal is helpful to improve peripheral light leakage of ultra narrow bezel displays.



spacer a spacer b

Picture2. Spacer a and spacer b in microscope, spacer b is slightly bigger than spacer a

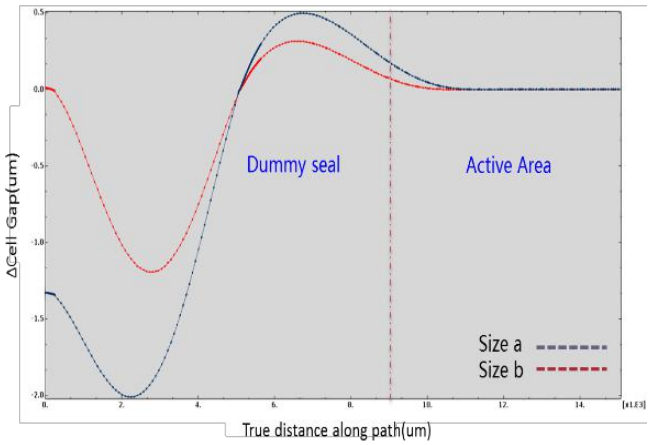


Figure2. Changing height of dummy seal

In the third place, we use dummy seal with different Young's modulus to study the effect of dummy seal hardness on peripheral light leakage of ultra narrow bezel displays. But we find dummy seal with different Young's modulus can't improve peripheral light leakage. Because the gap difference between dummy area and active area is same by using different dummy seal (figure3).

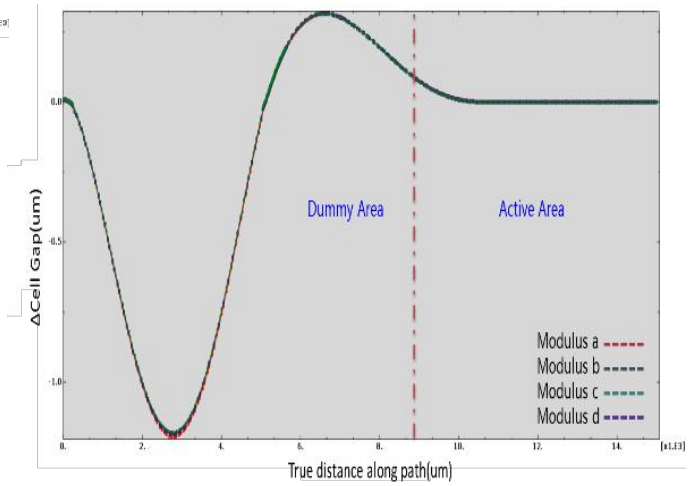


Figure3. Changing Young's modulus of dummy seal

In conclusion, the distance of dummy seal to main seal and the height of dummy seal can effectively improve peripheral light leakage of ultra narrow bezel displays. To some extend, the distance is nearer or the height of dummy seal is higher, the peripheral light leakage is milder. But changing Young's modulus of dummy seal is useless to reduce peripheral light leakage of ultra narrow bezel displays.

3 Summary

Peripheral light leakage of ultra narrow bezel displays can be improved by changing the distance between dummy seal and main seal. It also can be solved by altering the height of dummy seal. These two methods both have remarkable effect to improve peripheral light leakage, which is a perennial problem in ultra narrow bezel displays.

References: None