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(54) **CONDUCTING WIRE STRUCTURE FOR A LIQUID CRYSTAL DISPLAY**

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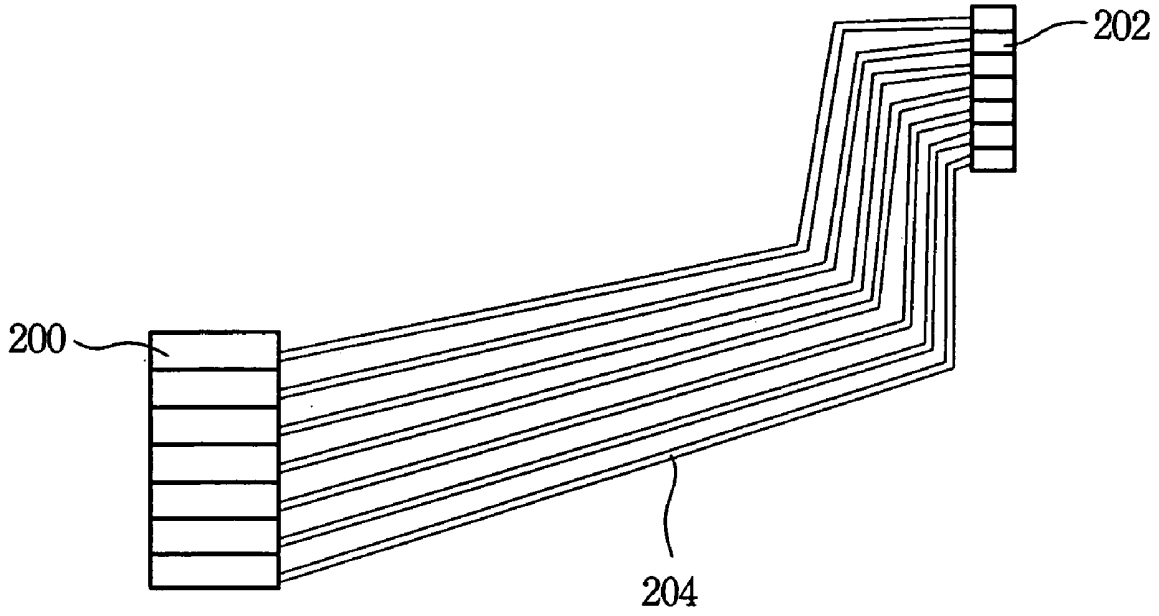
(57) **ABSTRACT**

The present invention provides a conducting wire structure for a liquid crystal display. This structure uses bent conducting wires to connect the peripheral terminals with the pixel region. These bent conducting wires are designed to form different lengths or widths to achieve equal resistance and to fit in the cramped space between the pixel region and the peripheral terminals.



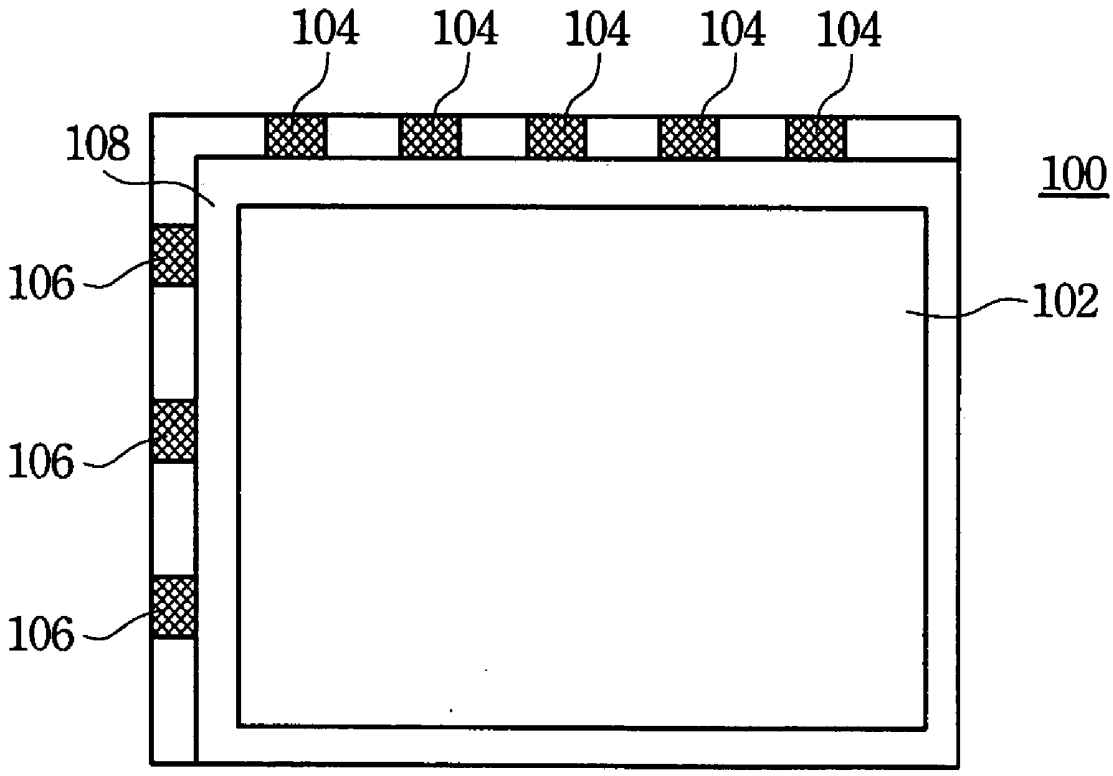


Fig. 1 (PRIOR ART)

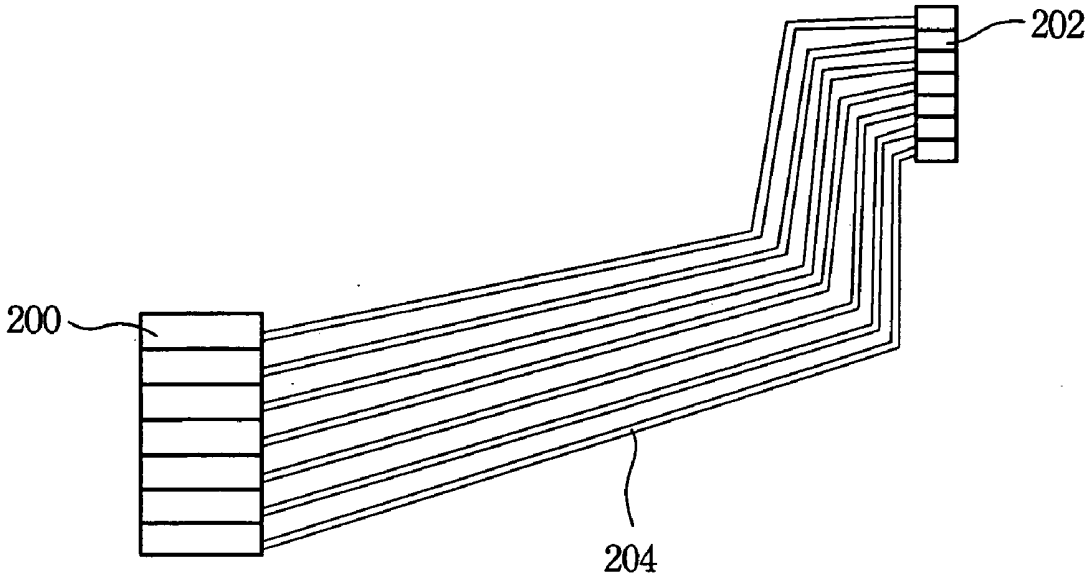


Fig. 2A

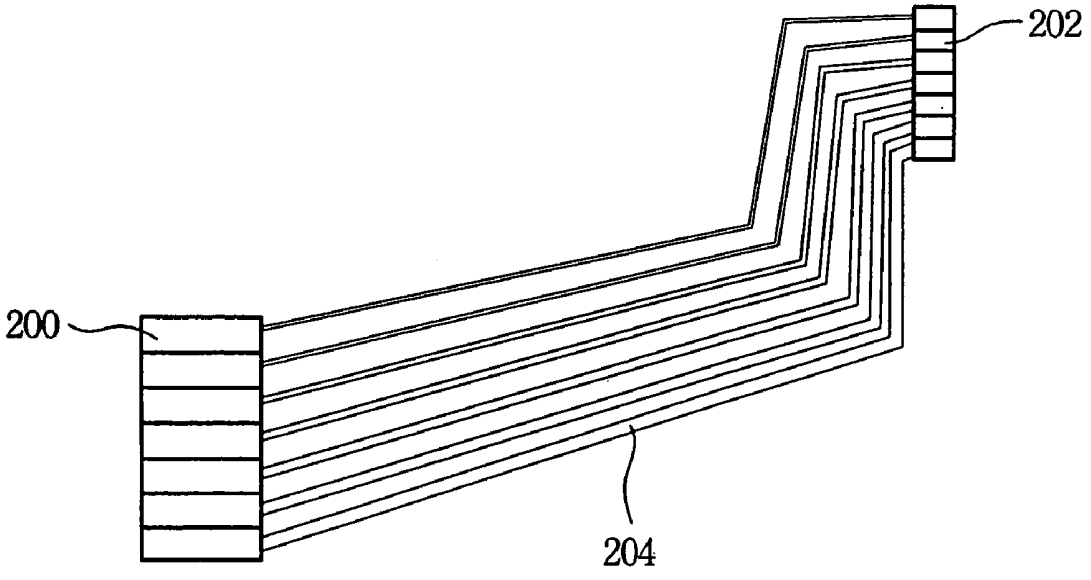


Fig. 2B

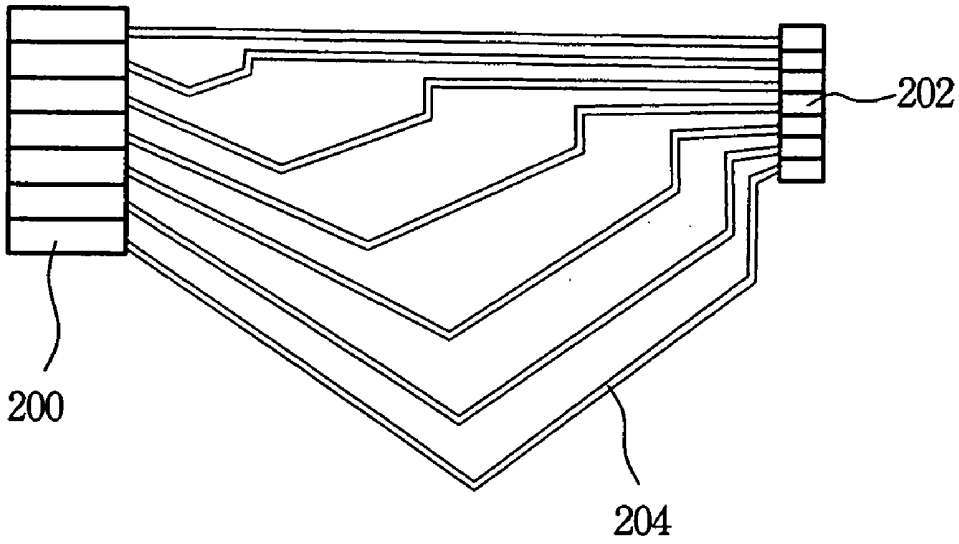


Fig. 3A

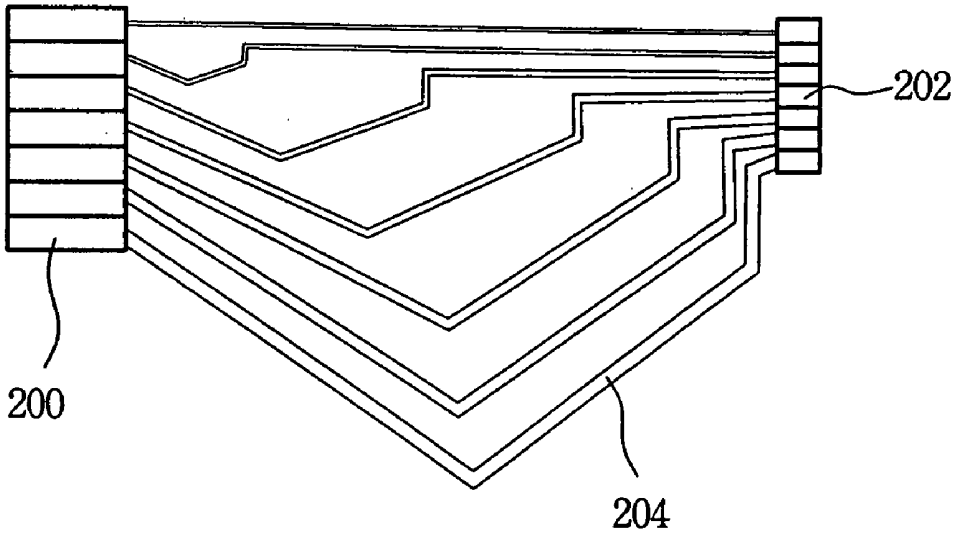


Fig. 3B

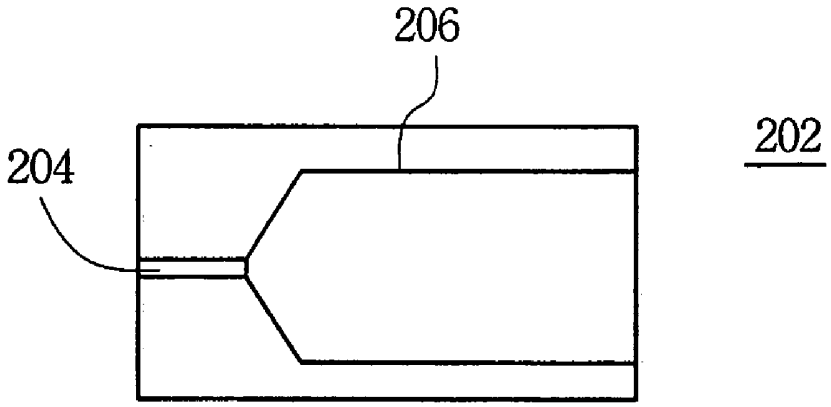


Fig. 4

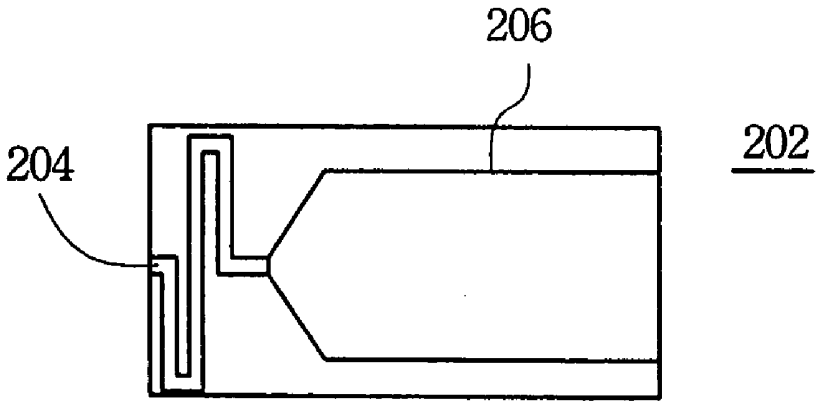


Fig. 5

CONDUCTING WIRE STRUCTURE FOR A LIQUID CRYSTAL DISPLAY

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a division of U.S. application Ser. No. 10/654,710 filed Sep. 4, 2003 for "Conducting Wire Structure for a Liquid Crystal Display" by Meng-Chi Liou, Yung-Hui Chang, Nei-Jen Hsiao and Fu-Yuan Shiau.

INCORPORATION BY REFERENCE

[0002] The aforementioned U.S. application Ser. No. 10/654,710 is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0003] The present invention relates to a conducting wire structure, and more particularly to a conducting wire structure for a Liquid Crystal Display (LCD).

BACKGROUND OF THE INVENTION

[0004] User demand for entertainment equipment is particularly high as a result of the rapid development of liquid crystal display (LCD). Demand for greater comfort in use is driving the market towards larger LCDs; however, this trend compresses the space between the LCD panel and the shell.

[0005] **FIG. 1** illustrates a diagram of a thin film transistor liquid crystal display panel (TFT LCD Panel). Typically, an LCD panel **100** comprises a pixel region **102**, gate side peripheral terminals **104**, source side peripheral terminals **106** and conducting wires **108** for connecting peripheral terminals **104** and **106** to the pixel region **102**. However, the large size LCD can increase the resistance of the conducting wires **108**. This will also enlarge the RC delay phenomenon. Moreover, the different resistances among the conducting wires **108** even influence the input signal among the gate lines and the source lines. On the other hand, the requirement for a light weight and high display quality LCD product further pushes the demand to reduce the space occupied by the peripheral terminals **104** and **106** and the conducting wires **108**.

[0006] Designing an LCD product so the structure of the conducting wires **108** is lightweight and the display quality high is thus very important. The conventional structure of the conducting wires, especially when using the chip on film peripheral terminals, cannot result in small volume and equal resistance among conducting wires.

SUMMARY OF THE INVENTION

[0007] It is an object of the present invention to provide a conducting wire structure having equal resistance among the conducting wires.

[0008] Another object of the present invention is to provide a conducting wire structure to reduce the required space of the conducting wires.

[0009] The present invention thus provides a conducting wire structure for a liquid crystal display. This structure uses bent conducting wires to connect the peripheral terminals to the pixel region. These bent conducting wires are designed with different lengths or widths to achieve equal resistance and to fit in the cramped space between the pixel region and the peripheral terminals. The equal resistance conducting wires reduce the RC delay value of the input signal from the peripheral terminals. On the other hand, the present invention also introduces an inner-shrink peripheral terminal. This terminal can create more space for the conducting wire.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

[0011] **FIG. 1** illustrates a schematic top view of a thin film transistor liquid crystal display panel (TFT LCD Panel);

[0012] **FIG. 2A** illustrates a schematic top view of a conducting wire structure according to the first preferred embodiment of the present invention;

[0013] **FIG. 2B** illustrates a schematic top view of a conducting wire structure with different widths according to the first preferred embodiment of the present invention;

[0014] **FIG. 3A** illustrates a schematic top view of a conducting wire structure according to the second preferred embodiment of the present invention;

[0015] **FIG. 3B** illustrates a schematic top view of a conducting wire structure with different widths according to the second preferred embodiment of the present invention;

[0016] **FIG. 4** illustrates a schematic top view of a peripheral terminal according to the first preferred embodiment of the present invention; and

[0017] **FIG. 5** illustrates a schematic top view of a peripheral terminal according to the second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] Without limiting the spirit and scope of the present invention, the conducting wire structure proposed in the present invention is illustrated with one preferred embodiment. One of ordinary skill in the art, upon acknowledging the embodiment, can apply the conducting wire structure of the present invention to various liquid crystal displays. This conducting wire structure uses bent conducting wires to connect the peripheral terminals with the pixel region. These bent conducting wires have different lengths or widths to achieve equal resistance and to fit in the cramped space between the pixel region and the peripheral terminals. Equal resistance conducting wires reduce the RC delay value variation of the input signal from the peripheral terminals. Such reduction also reduces the input signal variation among the gate lines and the source lines. Therefore, the display quality of the liquid crystal display can be improved. On the other hand, the present invention also introduces an inner-shrink peripheral terminal. This terminal can create more space for the conducting wire. The application of the present invention is not limited by the preferred embodiments described in the following.

[0019] **FIG. 2A** illustrates a schematic top view of a conducting wire structure according to the first preferred

embodiment of the present invention. These conducting wires **204** have different lengths to achieve equal resistance. On the other hand, to fit in the cramped space between the pixel terminal **200** and the peripheral terminal **202**, conducting wires **204** with different lengths are bent to connect the pixel terminal **200** and the peripheral terminal **202**. According to the first preferred embodiment, the conducting wires **204** are bent two times to change direction from the peripheral terminal **202**. It is noted that the bent angle must be less than 90 degrees to avoid point discharge. On the other hand, these conducting wires **204** can have different widths to reduce the resistance difference among them, and consequently reduce the RC delay variation of the input signal from the peripheral terminal **202**. In other words, these conducting wires **204** can have the same resistance by adjusting their widths as shown in **FIG. 2B**.

[**0020**] **FIG. 3A** illustrates a schematic top view of a conducting wire structure according to the second preferred embodiment of the present invention. It illustrates the conducting wires **204**, pixel terminal **200** and the peripheral terminal **202**. These conducting wires **204** have different lengths to achieve equal resistance. On the other hand, to fit in the cramped space between the pixel terminal **200** and the peripheral terminal **202**, conducting wires **204** with different lengths are bent in a V-shape to connect the pixel region **200** and the peripheral terminal **202**. It is noted that the bent angle must be less than 90 degrees to avoid point discharge. On the other hand, these conducting wires **204** can have different widths to reduce the resistance difference among them, consequently reducing the RC delay variation of the input signal from the peripheral terminal **202**. In other words, these conducting wires **204** can have the same resistance by adjusting their widths as shown in **FIG. 3B**.

[**0021**] The conducting wire structure described in the first and second embodiments also can be combined with a conventional conducting wire structure for use in a liquid crystal display in a cramped space. Moreover, this conducting wire structure of the present invention can be used on the gate side and the source side. The conducting wire structure of the present invention can be applied to various displays, such as the TFT LCD, STN LCD, OLED, LTPS and so on. It is noted that this conducting wire structure also can be used in any electrical product when the electrical product must be lightweight and only provides a limited space for the conducting wires.

[**0022**] **FIG. 4** illustrates a schematic top view of a peripheral terminal according to the first preferred embodiment of the present invention. An inner-shrink peripheral terminal **202** is introduced in the present invention to create a more space for the conducting wire. This terminal **206** is shrunk to create more space for the conducting wire **204**. This inner-shrink peripheral terminal **202** can improve the design flexibility of the conducting wire **204**.

[**0023**] **FIG. 5** illustrates a schematic top view of a peripheral terminal according to the second preferred embodiment of the present invention. According to the preferred embodiment, the terminal **206** is an inner-shrink terminal. The conducting wire **204** connected to the terminal **206** is bent to form a plurality of bent portions. These bent portions can increase the length of the conducting wire **204** to increase its resistance.

[**0024**] According to above descriptions, the conducting wire structure of the present invention has many advantages. First, the conventional conducting wire structure, especially chip on film peripheral terminals, cannot achieve a small volume and equal resistance among conducting wires. However, the present invention uses bent conducting wires to connect the peripheral terminals to the pixel region to reduce the space requirement. On the other hand, the present invention also introduces an inner-shrink peripheral terminal that can create more space for the conducting wire. Therefore, the user can utilize the additional space to modify the conducting wire resistance to reduce the difference.

[**0025**] As is understood by a person skilled in the art, the foregoing preferred embodiments of the present invention are illustrative of the present invention rather than limiting of the present invention. It is intended that this description cover various modifications and similar arrangements included within the spirit and scope of the appended claims, the scope of which should be accorded the broadest interpretation so as to encompass all such modifications and similar structure.

What is claimed is:

1. A conducting wire structure for a liquid crystal display, wherein said conducting wire structure is formed over a liquid crystal display panel having a display region, said structure comprising:

a plurality of peripheral terminals located around said liquid crystal display panel, wherein said peripheral terminals are inner-shrink terminals with spaces respectively;

a plurality of pixel terminals located in said display region; and

a plurality of conducting wires having at least two bent portions for connecting said peripheral terminals and said pixel terminals, wherein said conducting wires have equal resistance and at least a portion of each conducting wire is located in corresponding said space, wherein said equal resistance is reached by forming conducting wires with different widths.

2. The structure according to claim 1, wherein said peripheral terminals are source-side peripheral terminals.

3. The structure according to claim 1, wherein said peripheral terminals are gate-side peripheral terminals.

4. The structure according to claim 1, wherein angles of said bent portions are greater than 90 degrees.

5. The structure according to claim 1, wherein said bent portions are bent in a V.

6. The structure according to claim 1, wherein the conducting wire located in said space has at least one bent portion.

* * * * *

专利名称(译)	用于液晶显示器的导线结构		
公开(公告)号	US20060256272A1	公开(公告)日	2006-11-16
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[标]申请(专利权)人(译)	中华映管股份有限公司		
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当前申请(专利权)人(译)	中华映管股份有限公司.		
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外部链接	Espacenet USPTO		

摘要(译)

本发明提供一种用于液晶显示器的导线结构。该结构使用弯曲的导线将外围端子与像素区域连接。这些弯曲的导线被设计成形成不同的长度或宽度以实现相等的电阻并且适合于像素区域和外围端子之间的狭窄空间。