(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
16 September 2010 (16.09.2010)

PCT

(10) International Publication Number
WO 2010/102491 A1

(51) International Patent Classification:
G02F 1/133 (2006.01) *G06F 3/044* (2006.01)

(21) International Application Number:
PCT/CN2009/074916

(22) International Filing Date:
12 November 2009 (12.11.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
200910008184.5 13 March 2009 (13.03.2009) CN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

(54) Title: LIQUID CRYSTAL DISPLAY INTEGRATED WITH CAPACITIVE TOUCH DEVICES

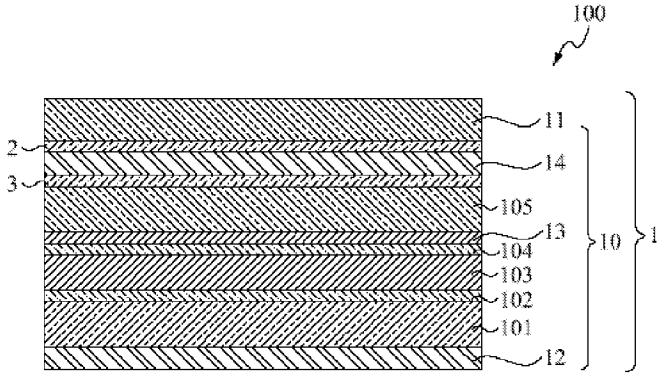

FIG.3

(57) Abstract: A liquid crystal display integrated with a capacitive touch device comprises a first electrode layer (2) and a second electrode layer (3). The first electrode layer (2) is formed immediately on the upper surface of a polarizing plate (14) of a liquid display panel (1), and the second electrode layer (3) is formed on the bottom surface of the polarizing plate (14) of the liquid crystal display panel (1).

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LIQUID CRYSTAL DISPLAY INTEGRATED WITH CAPACITIVE TOUCH DEVICES

FIELD OF THE INVENTION

[0001] The present invention relates to a liquid crystal display integrated with a touch device. More specifically, it relates to a liquid crystal display integrated with a capacitive touch device.

BACKGROUND OF THE INVENTION

[0002] Liquid crystal displays (LCD) with various designs are commonly used by people. Please refer to **Fig. 1** and **Fig. 2**. **Fig. 1** is a sectional view of a conventional liquid crystal display panel, and **Fig. 2** is a sectional view of a liquid crystal display module. As shown in the figures, the liquid crystal display panel **1** comprises a liquid crystal display module **10** and a protective layer **11** attached thereon.

[0003] The liquid crystal display module **10** includes a lower polarizing plate **12**, a lower substrate **101**, a lower conductive layer **102**, a liquid crystal layer **103**, an upper conductive layer **104**, a color filter **13**, an upper substrate **105** and an upper polarizing plate **14**.

[0004] The industry has developed certain technologies for the integration of liquid crystal display panel and touch device, which can make the operation easier. In early stage, the touch device comprises resistance films. When an object touches the surface of the touch device, a stress generated by the object brings the two resistance films into physical contact, so that a switch is turned on and a touch signal is sent to a controller for processing to determine the touched position. However, after long-term usage, the resistance films are prone to damages caused by frequent pressing and it becomes hard to precisely determine the touched position.

[0005] In order to overcome the above mentioned defects of the designs that utilized resistance films, a capacitive touch device has developed. A capacitive touch device comprises two touch sensing layers and a medium layer arranged between the two touch sensing layers. In conventional manufacturing processes, the liquid crystal display panel and the capacitive touch device are produced separately, and then subsequently stacked and attached together. A user can use a conductive object such as a finger or stylus to select the icons shown on the surface of the touch device to operate or to input data.

SUMMARY OF THE INVENTION

[0006] However, it is required to separately attach a protective layer to the surface of the touch device and that of the liquid crystal display panels. The protective layers are primarily made of glass. As a result, the use of two protective layers requires the consumption of a large amount of materials for manufacturing. In addition, as described above, touch devices and liquid crystal displays are separately manufactured, and then subsequently stacked and adhered together. Such an assembly process is complicated and time consuming, and also tends to produce defective products. Moreover, the products manufactured in this way will inherently have a greater thickness, which makes it difficult to further slim down the whole device.

[0007] It is an object of the present invention to provide a liquid crystal display with an integrated capacitive touch device that does not require additional substrates. In this way, further reduction in device thickness can be achieved.

[0008] The liquid crystal display of the present invention, in one embodiment, comprises a liquid crystal display panel, a first electrode layer and a second electrode layer. The liquid crystal display panel comprises a liquid crystal display module comprising an upper polarizing plate and a lower polarizing plate. The first electrode layer comprises an electrode pattern (e.g., a predetermined electrode pattern) formed on a surface, such as the top surface, of the upper polarizing plate. The second electrode layer comprises an electrode pattern

formed on the bottom of the upper polarizing plate.

[0009] In another embodiment, a liquid crystal display and a capacitive touch sensing layer that is capable of sensing touch movement in a first and a second direction, such as X-axis movement and Y-axis movement, are included. The capacitive touch sensing layer is formed immediately on a surface, such as the top or bottom surface, of the upper polarizing plate.

[0010] By means of the present invention, a liquid crystal display as described can be integrated with a capacitive touch device without using extra substrates. The present invention enables an integrated capacitive touch device be made slimmer and lighter. More particularly, the liquid crystal display is directly integrated with capacitive touch device in a simpler manufacturing process instead of being assembled together after separate manufacturing processes. It has many advantages such as a simpler manufacturing process, a higher yield rate, and a lower manufacture cost. In addition, because the electrode layer is attached, e.g., to the top of the upper polarizing plate of the liquid crystal display and is closer to the finger or other touch object, the electrode layer's touch-sensing ability is improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] **Fig. 1** is a sectional view of a conventional liquid crystal display panel;

[0012] **Fig. 2** is a sectional view of a conventional liquid crystal display module;

[0013] **Fig. 3** is a sectional view in accordance with a first embodiment of the present invention;

[0014] **Fig. 4** is an exploded view showing the first embodiment of the present invention;

[0015] **Fig. 5** is a exploded view showing a second embodiment of the present invention;

[0016] **Fig. 6** is a exploded view showing a third embodiment of the present invention;

[0017] **Fig. 7** is a sectional view of a portion of a capacitive touch sensing layer; and

[0018] **Fig. 8** is an exploded view showing a fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] Please refer to **Fig. 3**, which is a sectional view of a first embodiment of the present invention. As shown in **Fig. 3**, the liquid crystal display **100** of the present invention includes a liquid crystal display panel **1**, a first electrode layer **2,** and a second electrode layer **3**.

[0020] The liquid crystal display panel **1** comprises a lower polarizing plate **12**, a lower substrate **101**, a lower conductive layer **102**, a liquid crystal layer **103**, an upper conductive layer **104**, a color filter **13**, an upper substrate **105**, an upper polarizing plate **14** and a protective layer **11**. The color filter **13** includes a black matrix and a color resist.

[0021] The first electrode layer **2** is formed immediately on top of the upper polarizing plate **14**; and the second electrode layer **3** is formed immediately on the bottom of the upper polarizing plate **14**.

[0022] **Fig. 4** is an exploded view showing the first embodiment of the present invention. As shown in the figure, the first electrode layer **2** has an electrode pattern **20** including a plurality of electrode strips **21**, and the electrode strips **21** are substantially parallel to and spaced from each other. Similarly, the second

electrode layer **3** has an electrode pattern **30** that includes a plurality of electrode strips **31**, and the electrode strips **31** are substantially parallel to and spaced from each other. The electrode strips **21** of the first electrode layer **2** and the electrode strips **31** of the second electrode layer **2** are electrically coupled with a controller (not shown in the figure).

[0023] According to the first embodiment, the electrode strips **21** of the first electrode layer **2** are arranged in a direction substantially perpendicular to that of the electrode strips **31** of the second electrode layer **3**. The electrode strips **21** of the first electrode layer **2** is configured to sense a touch movement in a first direction, such as axis **Y**, and the electrode strips **31** of the second electrode layer **3** is configured to sense a touch movement in a second direction, such as axis **X**. It is apparent that the electrode strips **21** of the first electrode layer **2** can be configured to sense a touch movement in axis **X**, and the electrode strips **31** of the second electrode layer **3** is configured to sense a touch movement in axis **Y**.

[0024] The electrode strips **21** and **31** can have different shapes. For example, the electrode strips can have shapes of diamond, square, or hexagon. As shown in **Fig. 5**, a plurality of hexagonal electrodes **22** is connected to form an electrode strip of the electrode pattern 20a of the first electrode layer 2. Similarly, a plurality of hexagonal electrodes 32 is connected to form an electrode strip of the electrode pattern 30a of the second electrode layer 3.

[0025] The first electrode layer **2** and the second electrode layer **3** of the liquid crystal display are electrically coupled with the controller (not shown in figure). When a user touches the liquid crystal display (e.g., direct contact with a finger or indirect contact via a conductive object), the object is separately and capacitively coupled to the first electrode layer **2** and the second electrode layer **3**, so that, e.g., a touch signal corresponding to the **X**-axis coordinate and **Y**-axis coordinate of the touched position is generated and the signal is sent to the controller for further processing to determine the touched position.

[0026] Please refer to **Figs. 6** and **7**. **Fig. 6** is an exploded view showing a

third embodiment of the present invention and **Fig. 7** is a sectional view of a portion of a capacitive touch sensing layer. The third embodiment is similar to the first embodiment mentioned above. However, the difference between the two embodiments is that the third embodiment includes a capacitive touch sensing layer **4** formed on a top of the upper polarizing plate **14**.

[0027] The capacitive touch sensing layer **4** comprises an electrode pattern **40,** which comprises a plurality of first electrode strips **41** and second electrode strips **42**. The first electrode strips **41** are arranged in a direction substantially perpendicular to that of the second electrode strips **42**. The second electrode strips **42** overlap on the first electrode strips **41,** but the first and second electrode strips are not in direct physical contact. An insulating layer **43** is formed on the first electrode strips **41** at where the second electrode strips **42** overlap the first electrode strips **41** (as shown in **Fig. 7**), so that the second electrode strips **42** avoid direct physical contact with the first electrode strips **41**. Each first electrode strip **41** is formed by a string of connected hexagonal electrodes **411** and each second electrode strip **42** is formed by a string of connected hexagonal electrodes **421**. Due to the hexagonal shape, the first electrodes **41** and second electrodes **42** can effectively increase touch sensitivity.

[0028] When a user touches a capacitive touch device as described in the present invention with an object (e.g., a finger or a conductive object), the object is separately and capacitively coupled to the first electrode **41** and the second electrode **42**, so that a touch signal according to the touched area size and corresponding to the **X**-axis and **Y**-axis coordinate of touched position is generated and sent to the controller for further signal processing to determine the touched position (not shown in diagram).

[0029] **Fig. 8** is an exploded view according to a fourth embodiment of the present invention. The fourth embodiment is similar to the third embodiment mentioned above. However, the difference between the two embodiments is that the fourth embodiment comprises a capacitive touch sensing layer **4** formed on the bottom of the polarizing plate **14**. Similarly, when touching the liquid crystal

display with an object, the object is separately and capacitively coupled to the first electrode **41** and the second electrode **42** to generate a signal corresponding to the touched position.

[0030] Although the present invention has been described with reference to the embodiments thereof and the best modes for carrying out the present invention, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention, which is intended to be defined by the appended claims.

CLAIMS

1. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has an upper surface and a lower surface;

a first electrode layer having an electrode pattern, wherein the first electrode layer is formed immediately on the upper surface of the polarizing plate; and

a second electrode layer having an electrode pattern, wherein the second electrode layer is formed immediately on the lower surface of the polarizing plate.

2. The liquid crystal display as claimed in claim 1, wherein the electrode pattern of the first electrode layer and the second electrode layer comprises a plurality of electrode strips.

3. The liquid crystal display as claimed in claim 2, wherein each electrode strip of the first electrode layer and the second electrode layer comprises a plurality of electrically connected hexagonal electrodes.

4. The liquid crystal display as claimed in claim 1, further comprising an additional polarizing plate.

5. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer situated immediately adjacent to the polarizing plate.

6. The liquid crystal display as claimed in claim 5, wherein the capacitive touch sensing layer has an electrode pattern.

7. The liquid crystal display as claimed in claim 6, wherein the electrode pattern of the capacitive touch sensing layer comprises a plurality of first electrode strips and a plurality of second electrode strips, the first electrode strips being arranged in a direction substantially perpendicular to that of the second electrode strips and overlap the second electrode strips, and wherein the first electrode strips are not in direct physical contact with the second electrode strips.

8. The liquid crystal display as claimed in claim 7, wherein each electrode strip of the first electrode layer and each electrode strip of the second electrode layer are separately formed of a plurality of electrically connected diamond-shaped electrodes.

9. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer formed directly on the bottom surface of the polarizing plate, wherein the capacitive touch sensing layer includes first electrode strips for sensing movement in a first direction and second electrode strips for sensing movement in a second direction, and wherein the first electrode strips and the second electrode strips are not in direct physical contact.

10. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer formed directly on the top surface of the polarizing plate, wherein the capacitive touch sensing layer includes first electrode strips for sensing movement in a first direction and second electrode strips for sensing movement in a second direction, and wherein the first electrode strips is not in direct physical contact with the second electrode strips.

11. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has a first surface and a second surface; and

an electrode layer having an electrode pattern in immediate physical contact with the polarizing plate.

12. The integrated capacitive touch device of claim 11, wherein the electrode layer is in immediate physical contact with the first surface of the polarizing plate.

13. The integrated capacitive touch device of claim 11, wherein the electrode layer is in immediate physical contact with the second surface of the polarizing plate.

14. The integrated capacitive touch device of claim 11, wherein the electrode layer is configured to sense touch movement in a first direction and touch movement in a second direction.

15. The integrated capacitive touch device of claim 14, wherein the electrode layer senses touch movement in a first direction via first electrode strips and touch movement in a second direction via second electrode strips, and wherein the first electrode strips and second electrode strips are substantially perpendicular.

16. The integrated capacitive touch device of claim 11, further comprising an additional electrode layer, wherein the electrode layer is configured to sense touch movement in a first direction, and the additional electrode layer is configured to sense touch movement in a second direction.

17. The integrated capacitive touch device of claim 16, wherein the electrode layer is in immediate physical contact with the first surface of the polarizing plate, and wherein the additional electrode layer is in immediate physical contact with the second surface of the polarizing plate.

18. A liquid crystal display integrated with a capacitive touch device, comprising:

a liquid crystal display panel, comprising a liquid crystal display module, the liquid crystal display module comprising an upper polarizing plate and a lower polarizing plate;

a first electrode layer, having a predetermined electrode pattern formed on a top of the upper polarizing plate; and

a second electrode layer, having a predetermined electrode pattern formed on a bottom of the upper polarizing plate, wherein when an object touches the liquid crystal display, the object is capacitively coupled to the first electrode layer and the second electrode layer respectively, and the position touched by the object is determined.

19. A method for producing a liquid crystal display integrated with a capacitive touch device, comprising:

providing a liquid crystal display module comprising a polarizing plate; and

forming a capacitive touch sensing layer immediately on the polarizing plate.

20. A method of manufacturing a liquid crystal display integrated with a capacitive touch device, comprising:

providing a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has an upper surface and a lower surface;

forming a first electrode layer having an electrode pattern immediately on the upper surface of the polarizing plate; and

forming a second electrode layer having an electrode pattern immediately on the lower surface of the polarizing plate.

AMENDED CLAIMS
received by the International Bureau on 08 July 2010 (08.07.2010)

1. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has an upper surface and a lower surface;

a first electrode layer having an electrode pattern, wherein the first electrode layer is formed immediately on the upper surface of the polarizing plate; and

a second electrode layer having an electrode pattern, wherein the second electrode layer is formed immediately on the lower surface of the polarizing plate.

2. The liquid crystal display as claimed in claim 1, wherein the electrode pattern of the first electrode layer and the second electrode layer comprises a plurality of electrode strips.

3. The liquid crystal display as claimed in claim 2, wherein each electrode strip of the first electrode layer and the second electrode layer comprises a plurality of electrically connected hexagonal electrodes.

4. The liquid crystal display as claimed in claim 1, further comprising an additional polarizing plate.

5. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer formed directly on a surface of the polarizing plate.

wherein the capacitive touch sensing layer comprises a plurality of first

electrode strips and a plurality of second electrode strips overlapping the first electrode strips, and insulating layers are located at locations where the second electrode strips overlap the first electrode strips to separate them from each other.

6. The liquid crystal display as claimed in claim 5, wherein the first electrode strips are arranged in a direction substantially perpendicular to that of the second electrode strips.

7. The liquid crystal display as claimed in claim 6, wherein each first electrode strip and each second electrode strip are separately formed of a plurality of electrically connected diamond-shaped electrodes.

8. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer formed directly on the bottom surface of the polarizing plate, wherein the capacitive touch sensing layer includes first electrode strips for sensing movement in a first direction and second electrode strips for sensing movement in a second direction, and wherein the second electrode strips overlap the first electrode strips, and insulating layers are located at locations where the second electrode strips overlap the first electrode strips to separate them from each other.

9. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate; and

a capacitive touch sensing layer formed directly on the top surface of the polarizing plate, wherein the capacitive touch sensing layer includes first electrode strips for sensing movement in a first direction and second electrode strips for sensing movement in a second direction, and wherein the second electrode strips overlap the first electrode strips, and insulating layers are located at locations

where the second electrode strips overlap the first electrode strips to separate them from each other.

10. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has a first surface and a second surface; and

an electrode layer having an electrode pattern in immediate physical contact with the polarizing plate,

wherein the electrode layer senses touch movement in a first direction via first electrode strips and touch movement in a second direction via second electrode strips, and

wherein the second electrode strips overlap the first electrode strips, and insulating layers are located at locations where the second electrode strips overlap the first electrode strips to separate them from each other.

11. The integrated capacitive touch device of claim 10, wherein the electrode layer is in immediate physical contact with the first surface of the polarizing plate.

12. The integrated capacitive touch device of claim 10, wherein the electrode layer is in immediate physical contact with the second surface of the polarizing plate.

13. The integrated capacitive touch device of claim 10, wherein the first electrode strips and second electrode strips are substantially perpendicular.

14. An integrated capacitive touch device, comprising:

a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has a first surface and a second surface;

an electrode layer having an electrode pattern in immediate physical contact with the polarizing plate and configured to sense touch movement in a first direction; and

an additional electrode layer configured to sense touch movement in a second direction,

wherein the electrode layer is in immediate physical contact with the first surface of the polarizing plate, and the additional electrode layer is in immediate physical contact with the second surface of the polarizing plate.

15. A liquid crystal display integrated with a capacitive touch device, comprising:

a liquid crystal display panel, comprising a liquid crystal display module, the liquid crystal display module comprising an upper polarizing plate and a lower polarizing plate;

a first electrode layer, having a predetermined electrode pattern formed on a top of the upper polarizing plate; and

a second electrode layer, having a predetermined electrode pattern formed on a bottom of the upper polarizing plate, wherein when an object touches the liquid crystal display, the object is capacitively coupled to the first electrode layer and the second electrode layer respectively, and the position touched by the object is determined.

16. A method for producing a liquid crystal display integrated with a capacitive touch device, comprising:

providing a liquid crystal display module comprising a polarizing plate; and

forming a capacitive touch sensing layer immediately on the polarizing plate,

wherein the capacitive touch sensing layer comprises a plurality of first electrode strips and a plurality of second electrode strips overlapping the first electrode strips, and insulating layers are located at locations where the second electrode strips overlap the first electrode strips to separate them from each other.

17. A method of manufacturing a liquid crystal display integrated with a capacitive touch device, comprising:

providing a liquid crystal display module comprising a polarizing plate, wherein the polarizing plate has an upper surface and a lower surface;

forming a first electrode layer having an electrode pattern immediately on the upper surface of the polarizing plate; and

forming a second electrode layer having an electrode pattern immediately on the lower surface of the polarizing plate.

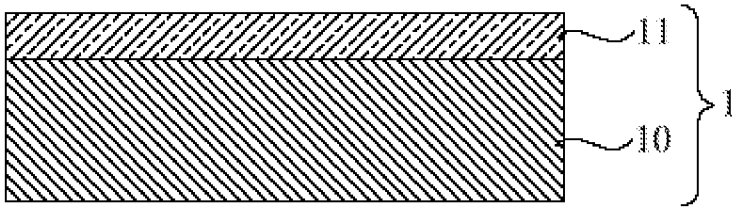

FIG.1(Prior Art)

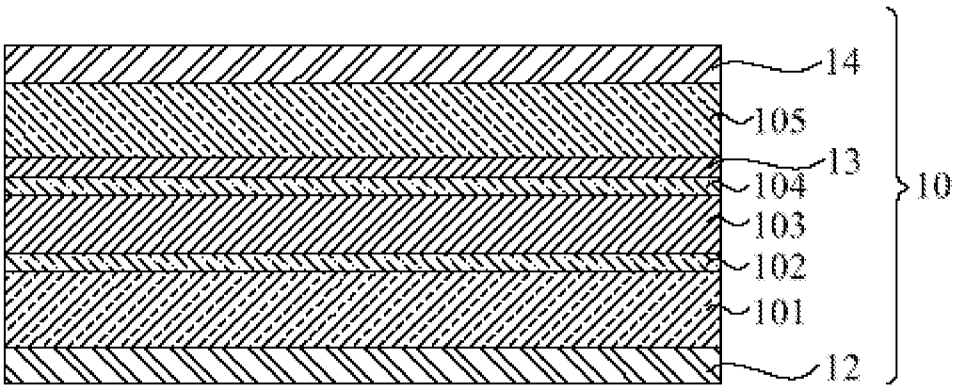

FIG.2(Prior Art)

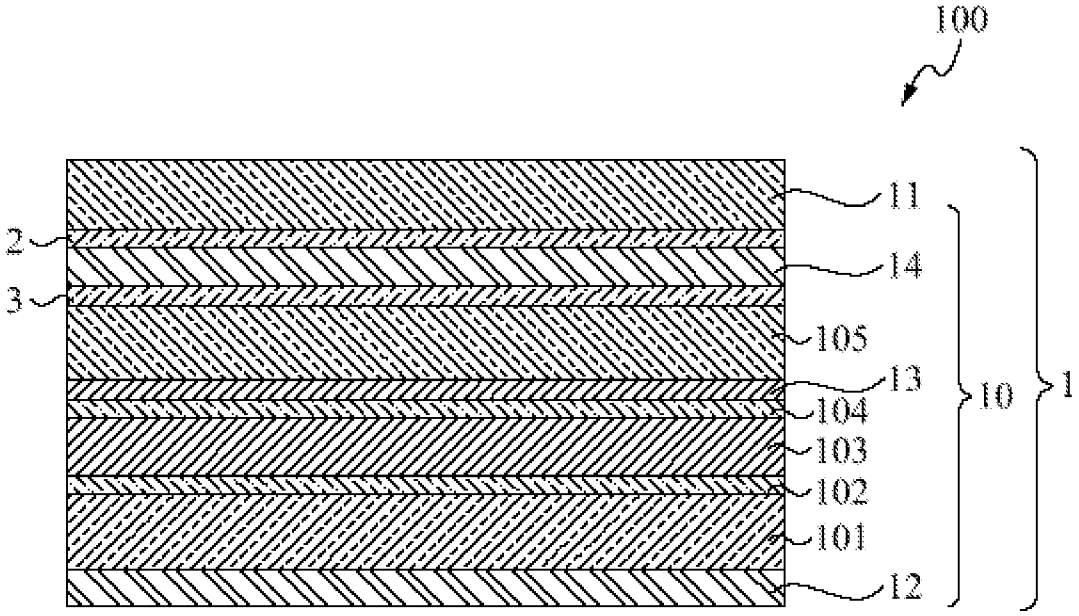

FIG.3

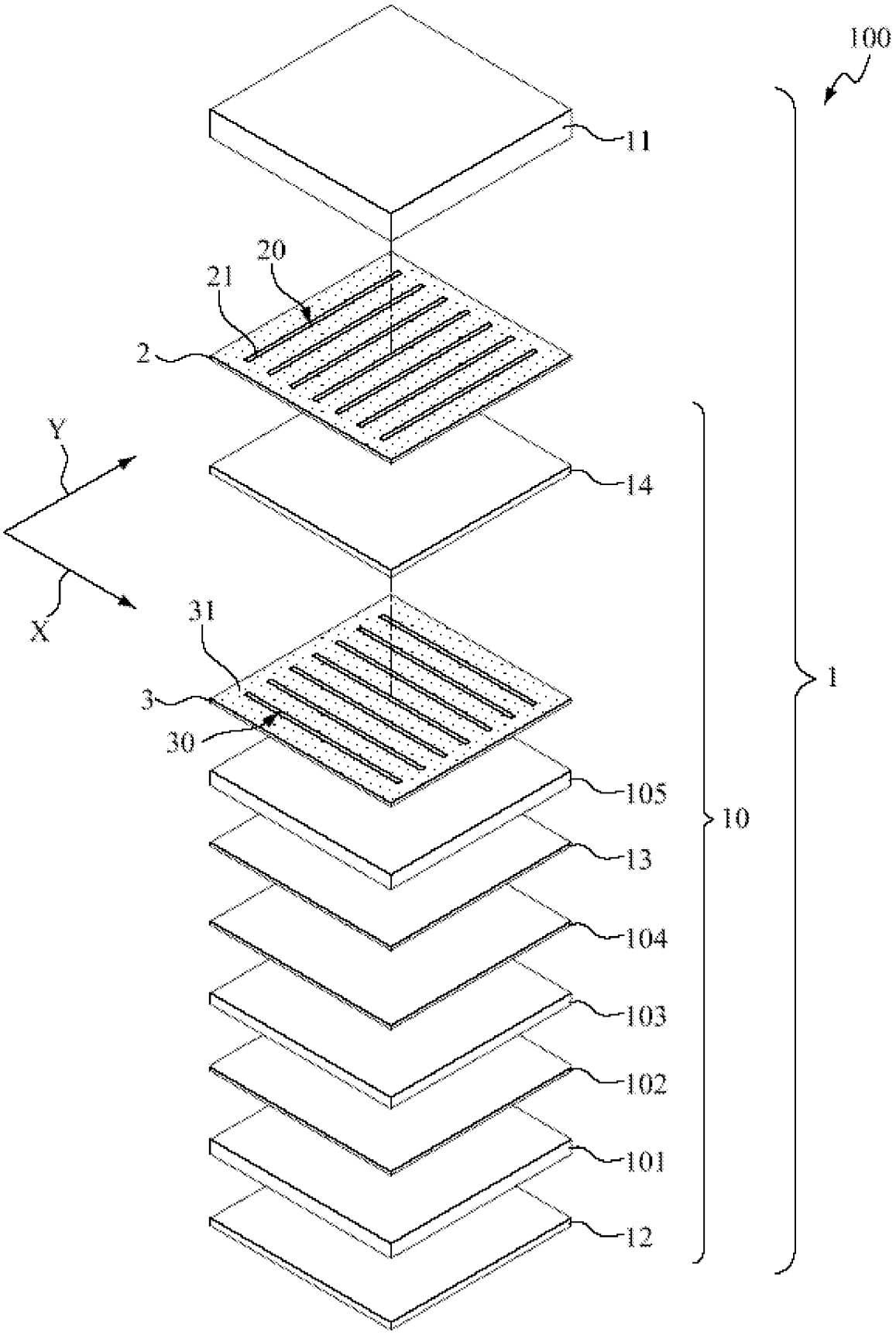

FIG.4

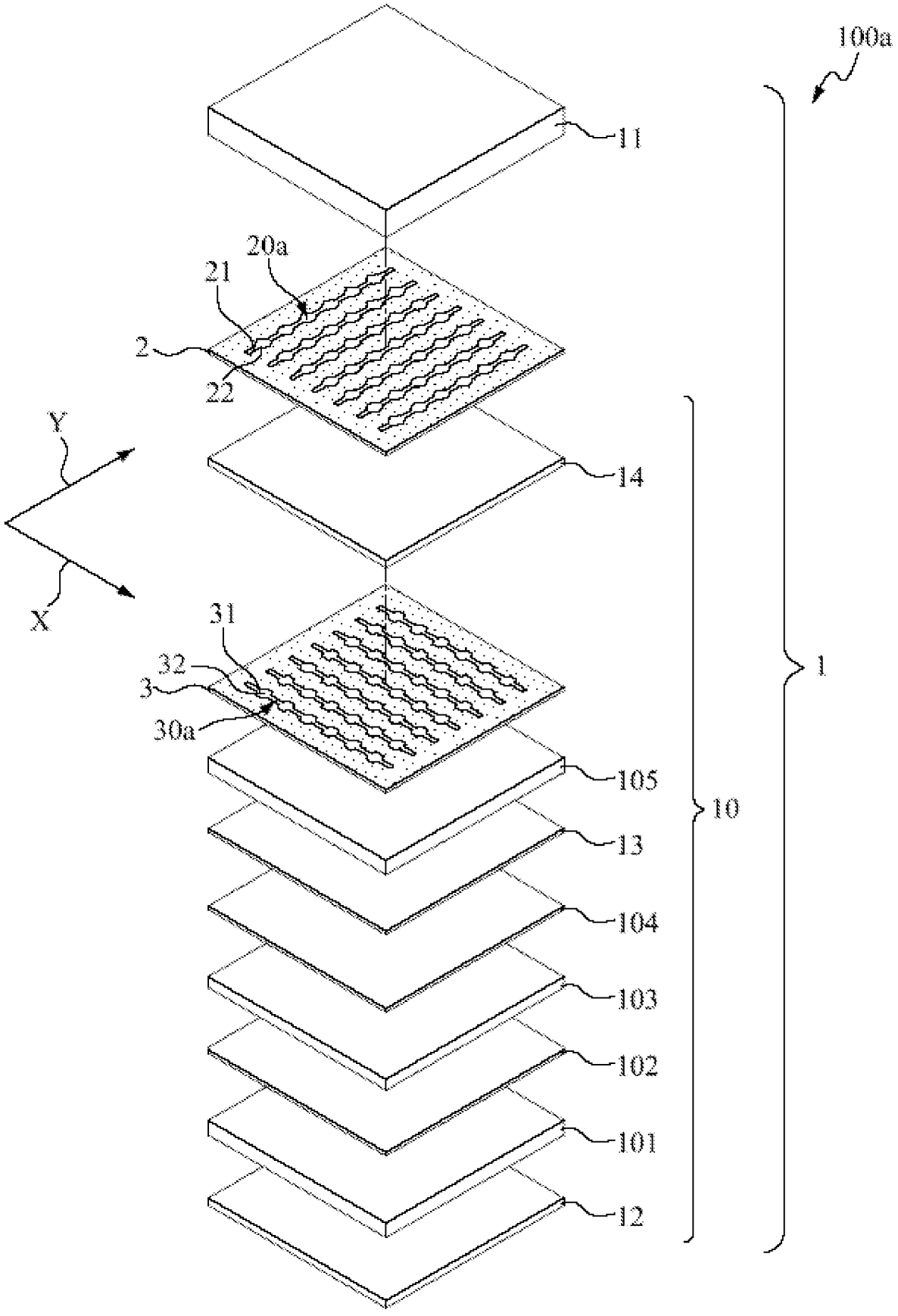

FIG.5

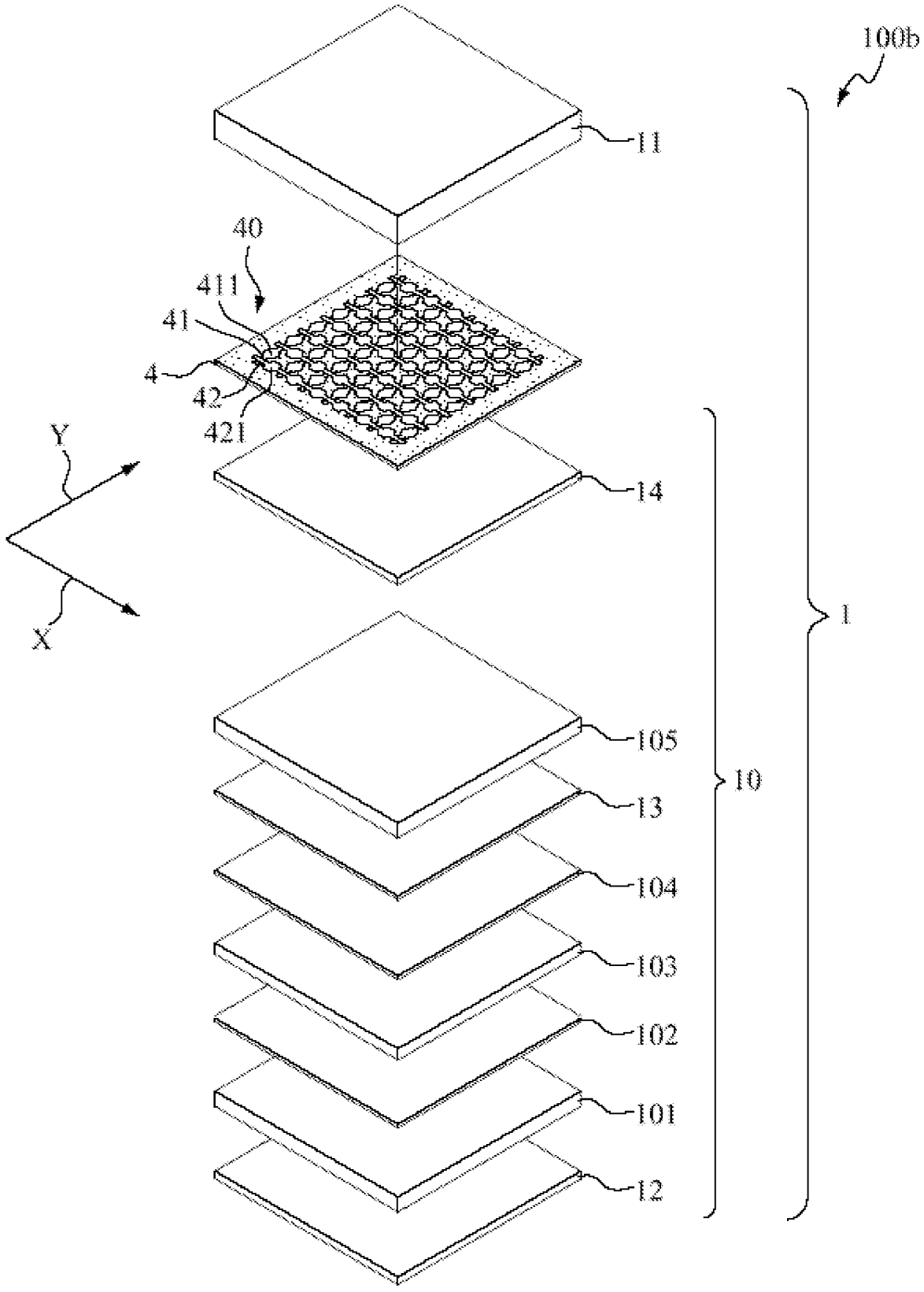

FIG.6

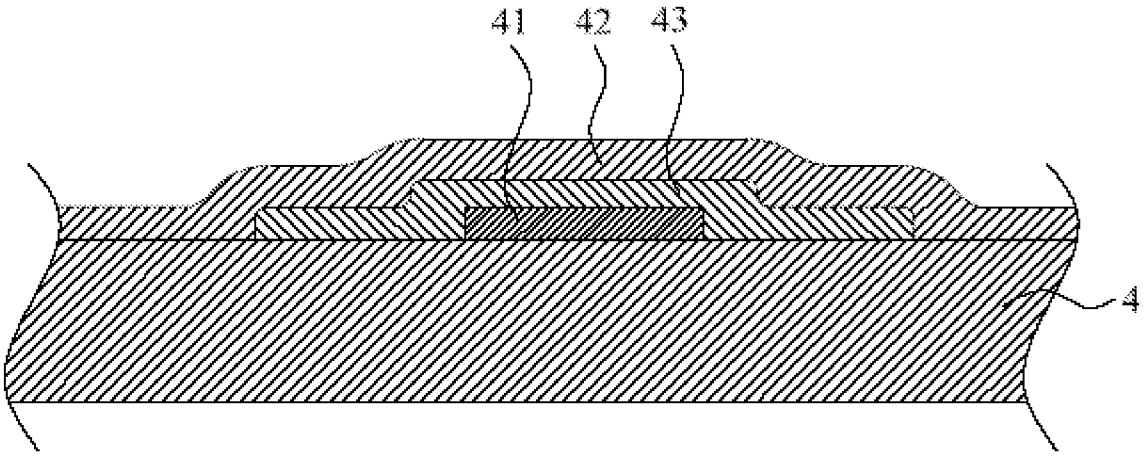

FIG.7

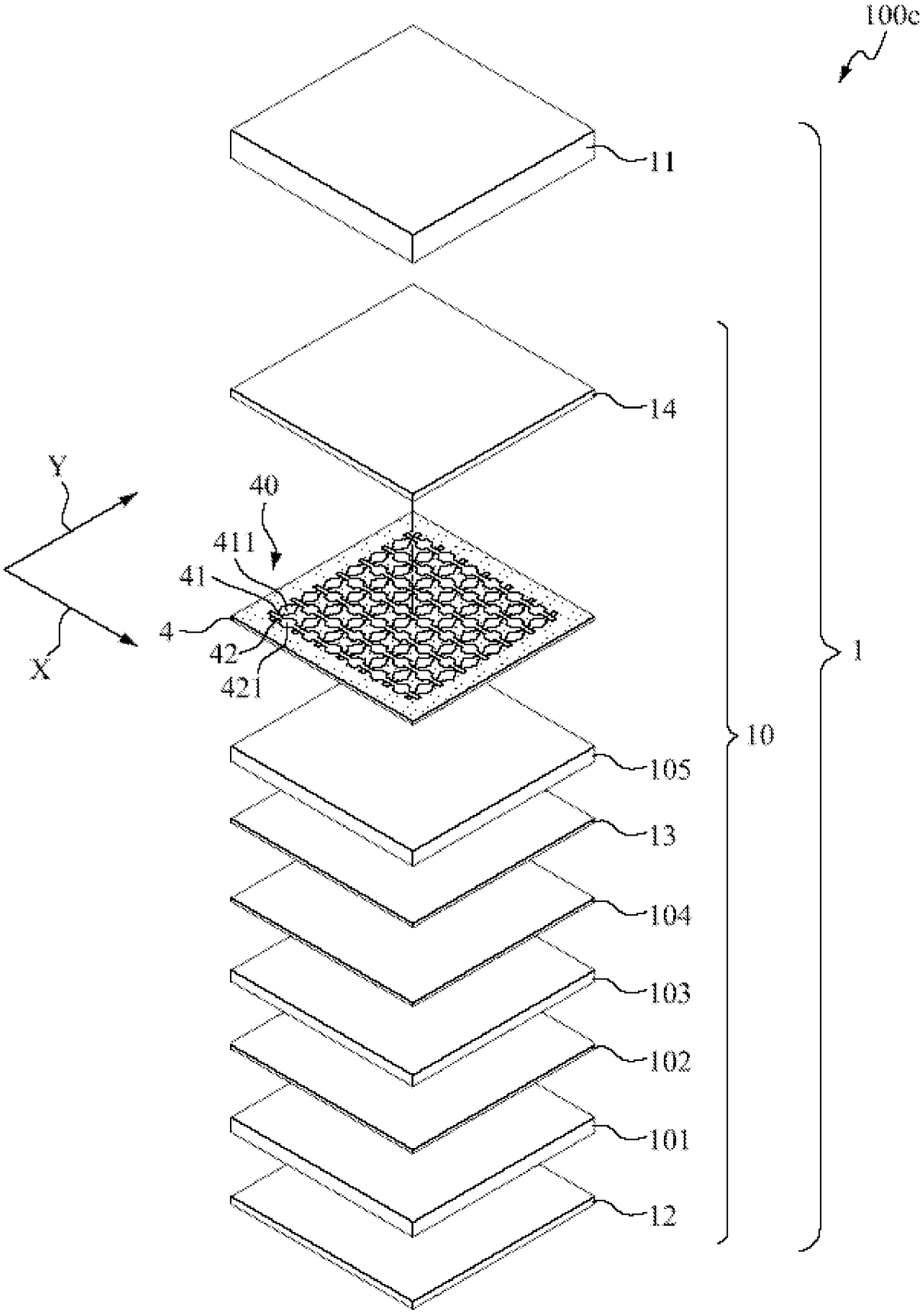

FIG.8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074916

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G02F G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI EPODOC CNPAT touch+ electrode pattern polariz+ liquid crystal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN101266348 A (SEIKO EPSON CORP) 17 Sept.2008 (17.09.2008) pages 3-5, and Figs.1-4	1-20
X	CN101286106 A (MATSUSHITA DENKI SANGYO KK) 15 Oct.2008 (15.10.2008) pages 3-4, and Figs.1-2	1-20
X	US2002033920 A1 (Ming-shen Sun) 21 Mar.2002 (21.03.2002) columns 3-5, and Figs. 1-3	1-20
A	CN1892319 A (CASIO COMPUTER CO LTD) 10 Jan.2001 (10.01.2001) the whole	1-20
A	CN1675580A (SAMSUNG ELECTRONICS CO LTD) 28 Sep.2005 (28.09.2005) the whole	1-20
A	CN101191930A (HITACHI DISPLAY DEVICES LTD) 04 Jun.2008 (04.06.2008) the whole	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 Feb.2009 (05.02.2009)	**25 Feb. 2010 (25.02.2010)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer ZHONG, Yanxin Telephone No. (86-10)62085562

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074916

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

I: Claims 1-4, 18, 20 directed to an integrated capacitive touch device and a liquid crystal display comprising the device and the producing method thereof. The solved problem is achieved by electrode layers formed on the different surfaces of the polarizing plate, respectively.
II: Claims 5-8, 9-10, 11-17, 19 directed to an integrated capacitive touch device and a producing method for a liquid crystal display. The solved problem is achieved by a capacitive touch sensing layer situated immediately adjacent to the polarizing plate or formed directly on the bottom/top surface of the polarizing plate.

Since the common or corresponding features between these groups of claims, i.e. an integrated capacitive touch device comprises a liquid crystal display module comprising a polarizing plate, and electrodes formed directly on the polarizing plate, are disclosed by CN101266348 A1, they have no technical relationship and do not belong to a single general inventive concept under PCT Rule 13.1.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on protest

☒ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/074916

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN101266348 A	17.09.2008	US2008224971A1	18.09.2008
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074916

CLASSIFICATION OF SUBJECT MATTER

G02F1/133(2006.01)i
G06F3/044(2006.01)i

专利名称(译)	液晶显示器集成了电容式触摸设备		
公开(公告)号	EP2406684A1	公开(公告)日	2012-01-18
申请号	EP2009841360	申请日	2009-11-12
[标]申请(专利权)人(译)	宸鸿光电科技股份有限公司		
申请(专利权)人(译)	TPK TOUCH SOLUTIONS INC.		
当前申请(专利权)人(译)	TPK TOUCH SOLUTIONS INC.		
[标]发明人	CHIEN SHUN TA CHANG HENG YAO		
发明人	CHIEN, SHUN-TA CHANG, HENG-YAO		
IPC分类号	G02F1/133 G06F3/044 G02F1/1333 G06F3/041		
CPC分类号	G02F1/13338 G02F1/133528 G06F3/0412 G06F3/0445 G06F3/0446		
优先权	200910008184.5 2009-03-13 CN		
其他公开文献	EP2406684A4		
外部链接	Espacenet		

摘要(译)

与电容式触控装置集成的液晶显示器包括第一电极层（2）和第二电极层（3）。第一电极层（2）直接形成在液晶显示板（1）的偏振板（14）的上表面上，第二电极层（3）形成在偏振板（14）的底表面上。 ）液晶显示板（1）。