

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number  
**WO 2004/019117 A3**

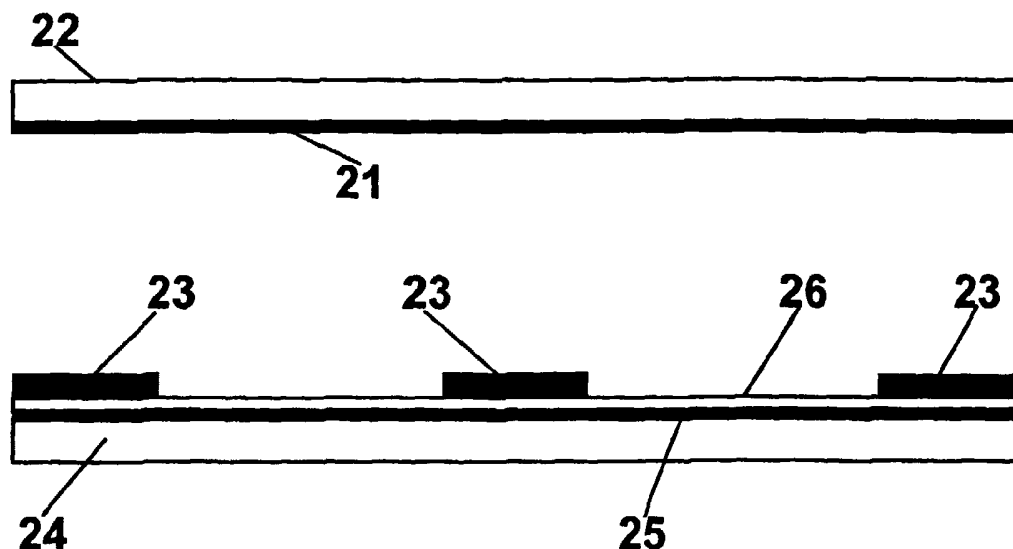
- (51) International Patent Classification<sup>7</sup>: **G02F 1/1343** (74) Agent: STEINBERGER, Brian, S.; 101 Brevard Avenue, Cocoa, FL 32922 (US).
- (21) International Application Number: PCT/US2003/026829 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 26 August 2003 (26.08.2003) (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/405,999 26 August 2002 (26.08.2002) US  
10/643,063 18 August 2003 (18.08.2003) US
- (71) Applicants: **RESEARCH FOUNDATION OF THE UNIVERSITY OF CENTRAL FLORIDA, INCORPORATED** [US/US]; 4000 Central Florida Blvd. Milligan Hall, Room 360, Orlando, FL 32816-0015 (US). **AU OPTRONICS CORPORATION** [CN/CN]; No. 1, Li-Hsin Rd. 2, Science-Based Industrial Park, Hsinchu 300, Taiwan (CN).
- (72) Inventors: **CHOI, Wing-Kit**; 4525 Black Knight Drive, #203, Orlando, FL 32817 (US). **WU, Shin-Tson**; 1388 Tall Maple Loop, Oviedo, FL 32765 (US).

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: HIGH SPEED AND WIDE VIEWING ANGLE LIQUID CRYSTAL DISPLAYS



(57) Abstract: Novel structural configurations of a TFT-LCD (Thin Film Transistor Liquid Crystal Display) which results in both fast response to input data and provides wide-viewing-angles. The structure of the device is comprised of one pixel electrode layer (25) and two common electrode layers (21, 23). The structure of the invention can be used with liquid crystal display television (LCD-TV) monitors that require both fast-response as well as wide-viewing-angle. In addition, other liquid crystal technologies which require high speed response would benefit from the TFT-LCD of the present invention.



**(88) Date of publication of the international search report:**  
17 March 2005

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(15) Information about Correction:**

**Previous Correction:**

see PCT Gazette No. 28/2004 of 8 July 2004, Section II

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26829

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : G02F 1/1343

US CL : 349/141

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)

U.S. : 349/141

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NoneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
None**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0089632 A1 (WONG) 11 July 2002 (11.07.2002), [0029]-[0031] and Figure 5.	1-5, 10-12
X	US 5,978,059 A (OHTA et al) 02 November 1999 (02.11.1999), column 7, lines 39-49.	1-18



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;"

document member of the same patent family

Date of the actual completion of the international search

16 November 2004 (16.11.2004)

Date of mailing of the international search report

28 JAN 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Jeanne Andrea Di Grazio

Telephone No. (571)272-2289

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26829

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

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

1. ☐ Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claim 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:  
Please See Continuation Sheet
3. ☒ Claim Nos.: 6-8  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

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 fee, this Authority did not invite payment of any 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.

No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

PCT/US03/26829

### Continuation of Box I Reason 2:

Claim 6 reads: "The display of claims 3, 4 and 5, wherein the means for supplying a voltage source to one of the first common electrode layer and the second common electrode layer results in an unequal voltage." Claims 7 and 8 depend from claim 6.

### BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-5 and 9-12, drawn to a thin film transistor liquid crystal display having fast response and wide viewing angle.

Group II, claim(s) 13-18, drawn to a method of providing fast response and wide viewing angle to thin film transistor liquid crystal displays.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Methods of driving / using as claimed in claims 13-18 may and do vary considerably and do not necessarily depend upon the recited structure as claimed in claims 1-12. Applicant furthermore claims multiple methods of driving (for example, contrast claims 14 and 15 which recite vertical and non-vertical electric fields respectively). Please note that the Examiner notices possible method of use language in claims 6-8 which may not be proper for device claims.