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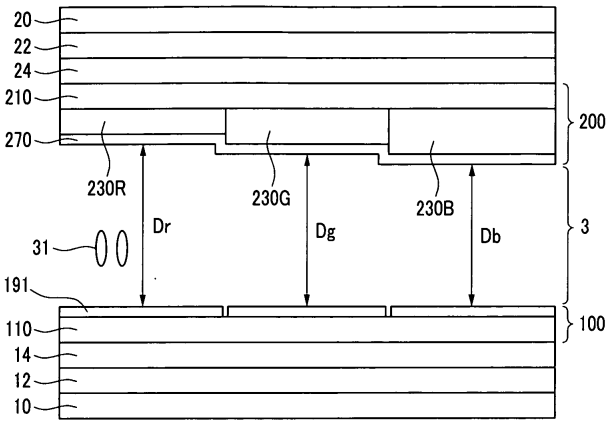
## (54) Liquid crystal display

(57) A liquid crystal display includes a lower panel (100), an upper panel (200) facing the lower panel and including a plurality of red color filters (230R), green color filters (230G), and blue color filters (230B), and a liquid crystal layer (3) interposed between the lower and upper panels. The liquid crystal layer has first, second and third cell-gap portions corresponding to the red, green and blue filters, respectively, and the first second and third cell-gap portions have cell gaps Dr, Dg and Db, respectively. A first compensation film (14,24) is disposed on an outer surface of one of the lower panel or the upper panel. A lower polarizer (12) is on the outer surface of the lower panel and an upper polarizer (22) is on the outer surface of the upper panel. The cell gaps Dr, Dg and Db may satisfy the equation $0\mu m \leq Dg-Db$ and $Dr-Dg \leq 0.5\mu m$.

FIG.2

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# EUROPEAN SEARCH REPORT

Application Number
EP 09 00 1733

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 2007/076152 A1 (ITO HIDEKI [JP] ET AL) 5 April 2007 (2007-04-05)<br>* figure 1a *<br>* paragraph [0029] - paragraph [0047] * | 1-4,16 | INV.<br>G02F1/13363<br>G02F1/1335<br>G02F1/139 |
| X | US 2005/062917 A1 (KASHIMA KEIJI [JP]) 24 March 2005 (2005-03-24)<br>* page 2 *<br>* paragraph [0063] * | 1-4,16 | |
| X | US 2006/139274 A1 (SONG JANG-KUN [KR] ET AL) 29 June 2006 (2006-06-29)<br>* figures 2a,2b,3 *<br>* paragraph [0044] - paragraph [0055] * | 1-3, 5-13,27, 28 | |
| X | US 2007/177085 A1 (NISHIYAMA KAZUHIRO [JP] ET AL) 2 August 2007 (2007-08-02)<br>* figures 20,21 *<br>* paragraph [0134] - paragraph [0136] *<br>* paragraph [0170] - paragraph [0179] * | 1-3, 5-13,27, 28 | TECHNICAL FIELDS SEARCHED (IPC)<br>G02F |
| A | US 6 157 425 A (KUO CHEN-LUNG [TW] ET AL) 5 December 2000 (2000-12-05)<br>* figure 1 *<br>* column 1, line 33 - line 53 * | 1-13,16, 27,28 | |
| A | WO 2006/093358 A (FUJI PHOTO FILM CO LTD [JP]; HIRAKATA JUNICHI [JP]) 8 September 2006 (2006-09-08)<br>* page 14, line 33 - page 16, line 19 * | 1-13,16, 27,28 | |

~~The present search report has been drawn up for all claims~~

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 11 September 2009 | Kentischer, Florian |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

## LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-13, 16, 27, 28

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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## LACK OF UNITY OF INVENTION
## SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-13,16,27,28

   Colour liquid crystal display device including an RGB colour filter and a first birefringent film for compensating the out-of-plane phase retardation of the LC layer (claim 5) or the cumulative out-of-plane phase retardation of the LC layer, upper an lower polarisers and substrates (claim 27) further comprised in the device, the display device having different cell gaps (claim 6) associated with different colour filter segments in order to compensate for different out-of-plane phase retardation values of the LC layer obtained in the red, green and blue wavelength regions due to chromatic dispersion.

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2. claims: 14-15

   Colour liquid crystal display device including an RGB colour filter and a first birefringent film for compensating the out-of-plane phase retardation of the LC layer, the display device having different liquid crystal materials of different refractive indices arranged in partitioned regions associated with different colour filter segments in order to compensate for different out-of-plane phase retardation values of the first birefringent film obtained in the red, green and blue wavelength regions due to chromatic dispersion.

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3. claims: 17-21

   Colour liquid crystal display device including an RGB colour filter, a first birefringent film for compensating the out-of-plane phase retardation of the LC layer, and a phase retarding layer patterned corresponding to the pattern of the RGB colour filter segments of the colour filter, the patterned phase redarding layer being arranged to compensate for different out-of-plane phase retardation values of the LC layer obtained in the red, green and blue wavelength regions due to chromatic dispersion.

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4. claims: 22-26

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## LACK OF UNITY OF INVENTION
## SHEET B

Application Number
EP 09 00 1733

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

Colour liquid crystal display device including an RGB colour filter and a first birefringent film for compensating the out-of-plane phase retardation of the LC layer, wherein the RGB colour filter constitutes at the same time a patterned phase retardation layer and is arranged to compensate for different out-of-plane phase retardation values of the LC layer obtained in the red, green and blue wavelength regions due to chromatic dispersion.

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 1733

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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11-09-2009

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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|---|---|---|---|
| 专利名称(译) | 液晶显示器 | | |
| 公开(公告)号 | EP2136246A3 | 公开(公告)日 | 2010-02-24 |
| 申请号 | EP2009001733 | 申请日 | 2009-02-07 |
| [标]申请(专利权)人(译) | 三星电子株式会社 | | |
| 申请(专利权)人(译) | SAMSUNG ELECTRONICS CO.，LTD. | | |
| 当前申请(专利权)人(译) | SAMSUNG ELECTRONICS CO.，LTD. | | |
| [标]发明人 | DO HEE WOOK<br>SHIN KI CHUL<br>KANG SUNGMIN | | |
| 发明人 | DO, HEE-WOOK<br>SHIN, KI-CHUL<br>KANG, SUNGMIN | | |
| IPC分类号 | G02F1/13363 G02F1/1335 G02F1/139 | | |
| CPC分类号 | G02F1/1393 G02F1/133371 G02F1/133514 G02F1/13363 G02F1/133634 G02F2413/02 G02F2413/09 G02F2413/13 | | |
| 代理机构(译) | DR.威猛和合作伙伴 | | |
| 优先权 | 1020080055192 2008-06-12 KR | | |
| 其他公开文献 | EP2136246A2 | | |
| 外部链接 | Espacenet | | |


摘要(译)

液晶显示器包括下面板（100），面向下面板并包括多个红色滤色器（230R）的上面板（200），绿色滤色器（230G）和蓝色滤色器（230B），以及液晶层（3）介于下板和上板之间。液晶层具有分别对应于红色，绿色和蓝色滤光器的第一，第二和第三单元间隙部分，并且第一和第三单元间隙部分分别具有单元间隙Dr，Dg和Db。第一补偿膜（14,24）设置在下面板或上面板之一的外表面上。下偏振器（12）位于下面板的外表面上，上偏振器（22）位于上面板的外表面上。单元间隙Dr，Dg和Db可以满足等式0μm≤Dg-Db和Dr-Dg≤0.5μm。


FIG.2