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(54) **Reduction of the parasitic capacitance of a pixel in a horizontal-electric-field type active matrix liquid crystal display**

(57) Two basic types of active matrix LCD substrate assembly (fig.1) are disclosed. Both employ a planar lower electrode (typically the common electrode, 270) and an upper electrode provided with cut-outs (92) on the AM-substrate (100) to produce a horizontal electric field component (fringe-field switching). First type: a light shielding layer (220, typically high permittivity) is in direct electrical contact with the common electrode (fig.2). The parasitic capacitance arising between the pixel (191) and common electrodes (220) at the edge of the contact hole (185) is reduced to improve display quality. Second type: the light shielding layer (20, typically low permittivity) extends over the edge (93) of a cut-out (92) in the upper electrode (mostly the pixel electrode 191) nearest the gate line (121, fig.9). The effect of the fringe field on the LC molecules at the edge is reduced to improve display transmittance.

FIG. 1

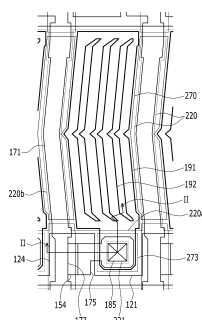


FIG. 2

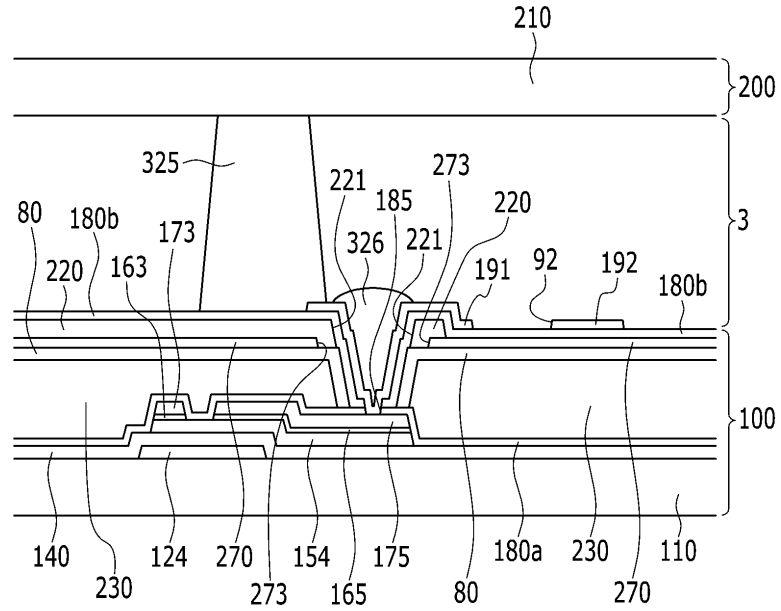
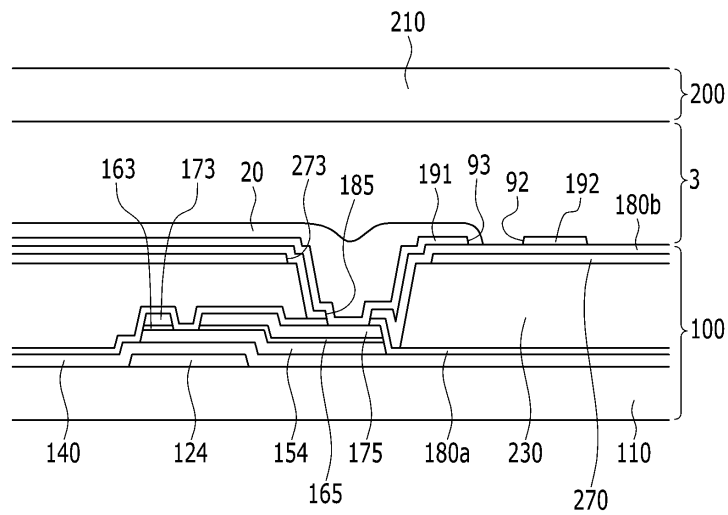


FIG. 9





EUROPEAN SEARCH REPORT

 Application Number
 EP 14 16 4241

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	EP 2 573 617 A1 (SAMSUNG DISPLAY CO LTD [KR]) 27 March 2013 (2013-03-27) * paragraphs [0041], [0044], [0049] * * paragraph [0053] - paragraph [0057] * * paragraphs [0060], [0061] * * paragraphs [0083], [0084] * * paragraphs [0096], [0097] * * figures 1,2,4,10 * * abstract *	1-3,8-10	INV. G02F1/1343 G02F1/1362
A	----- US 2006/290829 A1 (KIM DONG-GYU [KR]) 28 December 2006 (2006-12-28) * figures 1,2 * * paragraphs [0007], [0040], [0041] * * paragraphs [0057], [0066], [0070] *	1-3,8-10	
A	----- US 2001/026344 A1 (SAKAMOTO MICHIAKI [JP]) 4 October 2001 (2001-10-04) * paragraphs [0045], [0048] * * figures 1a,1b * -----	1-3,8-10	
			TECHNICAL FIELDS SEARCHED (IPC) G02F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		14 July 2014	Thomas, Kenneth
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			

 1
 EPO FORM 1503 03.82 (P04C01)



Application Number

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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:

1-3, 8-10

☐ 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).

**LACK OF UNITY OF INVENTION**
SHEET B

Application Number

EP 14 16 4241

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: 1-3, 8-10

FFS-type AM-LCD in which a light shielding layer is in electrical contact with the planar common electrode and is arranged directly on or below the latter. The pixel electrode arranged above the common electrode is provided with cut-outs.

2. claims: 4-6

FFS-type AM-LCD in which the light shielding layer is electrically connected to the planar common electrode through a hole in an intervening passivation layer. The pixel electrode is provided with cut-outs and is arranged above the common electrode.

3. claims: 7, 11, 12

FFS-type AM-LCD in which light shielding layer is in electrical contact and is arranged directly on or under the planar common electrode, wherein the planar pixel electrode is disposed underneath the common electrode which is provided with cut-outs.

4. claims: 13-18

FFS-type AM-LCD in which the light shielding layer is arranged on an upper electrode (pixel or common) to cover the edges of the cut-outs in that electrode nearest parallel to the gate-line. The light shielding layer is no longer restricted to being in direct contact with the common electrode.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 4241

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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14-07-2014

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专利名称(译)	降低水平电场型有源矩阵液晶显示器中像素的寄生电容		
公开(公告)号	EP2790058A3	公开(公告)日	2014-12-17
申请号	EP2014164241	申请日	2014-04-10
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星DISPLAY CO. , LTD.		
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代理机构(译)	DR.威猛和合作伙伴		
审查员(译)	THOMAS , KENNETH		
优先权	1020130157117 2013-12-17 KR 1020130039529 2013-04-10 KR		
其他公开文献	EP2790058A2 EP2790058B1		
外部链接	Espacenet		

摘要(译)

公开了两种基本类型的有源矩阵LCD基板组件 (图1)。两者都采用平面下电极 (通常是公共电极 , 270) 和在AM基板 (100) 上设置有切口 (92) 的上电极 , 以产生水平电场分量 (边缘场切换)。第一种类型 : 光屏蔽层 (220 , 通常是高介电常数) 与公共电极直接接触 (图2)。在接触孔 (185) 的边缘处的像素 (191) 和公共电极 (220) 之间产生的寄生电容减小 , 以改善显示质量。第二种类型 : 光屏蔽层 (20 , 通常是低介电常数) 在最靠近栅极线 (121 , 图9) 的上电极 (主要是像素电极191) 中的切口 (92) 的边缘 (93) 上延伸。)。边缘场对边缘处LC分子的影响减小 , 以改善显示透射率。

FIG. 1

