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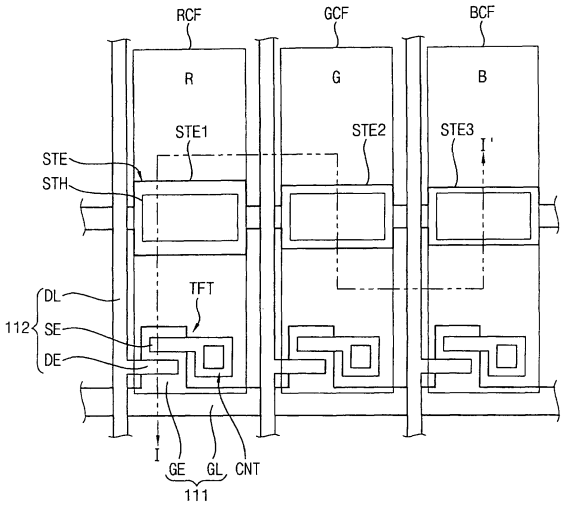
(54) Active matrix display substrate having tailored subpixel auxiliary capacitances according to colour

(57) In colour active matrix LCDs, the kickback voltages V_{kb} (also called feed-through voltages) may be different between pixels of a different colour. At low grey scale voltages, the kickback voltage (the drop in the voltage applied to the liquid crystal pixel at gate turn-off) becomes particularly significant: differences in the kickback voltages result in differences in the gamma voltages applied to those pixels, causing an undesirable colour shift. To equalise the kickback voltages and remove the colour shift, the pixel capacitances C_{st} or C_{gs}, on which the kickback voltages depend, are individually tailored for each colour.

The storage capacitance C_{st} is formed between the storage electrode (STE) and the pixel electrode (130). The dielectric is formed by a gate insulating layer (113). an overcoat layer (116) and a colour filter layer (120)- which is located on the thin film transistor substrate (140). The pixel electrode contacts the overcoat layer via a contact hole (STH) through the colour filter layer. The colour filter only contributes to the C_{st} dielectric at the sides of the contact hole. The C_{st} can be changed by either varying the STE area, the area of the opening of the contact hole over the STE or both.

Alternatively, the parasitic gate, source capacitance C_{gs} can be changed, either by changing the length of the source electrode (SE) which overlaps the gate electrode (GE) in the TFT itself of by providing a protrusion (SEC) from the source electrode which overlaps the gate line (DL) by a different amount.

FIG. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 08 00 3999

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y A	JP 2003 091017 A (CASIO COMPUTER CO LTD) 28 March 2003 (2003-03-28) * paragraphs [0005], [0016], [0020] * * paragraphs [0023] - [0033] * * paragraphs [0040], [0045] - [0047] * * figures 1-5 * *Patent Abstracts of Japan: text & figure*	1-3,5,6, 15 4,12-14, 16,19,20	INV. G02F1/1362 G09G3/36
Y A	US 2004/246424 A1 (SAWASAKI MANABU [JP] ET AL) 9 December 2004 (2004-12-09) * figures 16,17A,17B * * paragraphs [0092] - [0100] *	1-3,5,6, 15 4,12-14, 16,19,20	
X Y A	US 6 816 208 B2 (FUKAMI TETSUO [JP] ET AL) 9 November 2004 (2004-11-09) * column 1, line 6 - line 50 * * column 4, line 1 - line 4 * * column 4, line 45 - line 56 * * column 5, line 30 - line 35 * * column 6, line 1 - line 40 * * column 7, line 15 - line 26 * * column 19, line 6 - line 30 * * column 19, line 52 - column 20, line 7 * * figures 27A,27B * * figures 28A,28B * * figure 36 *	7,8,15, 16 9-11,17, 18 4,12-14, 16,19,20	TECHNICAL FIELDS SEARCHED (IPC) G02F G09G
A A	JP 10 039328 A (NIPPON ELECTRIC CO) 13 February 1998 (1998-02-13) * abstract *	7,8,15, 16 4,12-14, 16,19,20	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 November 2008	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
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& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application Number
EP 08 00 3999

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 028 650 A (KUROHA SYOICHI [JP] ET AL) 22 February 2000 (2000-02-22)	7,8,15, 16	
A	* column 2, line 53 - line 63 *	4,12-14, 16,19,20	

Y	US 2003/098935 A1 (LEE HSIN-TA [TW] ET AL) 29 May 2003 (2003-05-29)	9-11,17, 18	
A	* paragraphs [0011], [0014] *	4,12-14, 16,19,20	
	* paragraphs [0026] - [0029] *		
	* figure 5 *		

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 November 2008	Thomas, Kenneth

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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Application Number
EP 08 00 3999

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:

☐ 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
EP 08 00 3999

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

1. claims: 1-6, 15(Option 1), 16

   Active matrix LCD (AMLCD) wherein Cst is individually tuned by varying the area of at least one of the storage electrodes in the R, G, B pixels with respect to the others.

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2. claims: 7-8, 15(Option 2)

   AMLCD wherein Cst is individually tuned by varying the area of at least one of the storage holes over the storage electrodes in one of the R, G, B pixels with respect to the others.

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3. claims: 9-11, 17, 18

   AMLCD wherein Cgs is individually tuned by varying the area of at least one of the overlaps between the TFT source electrode and the gate electrode in one of the R, G, B pixels with respect to the others.

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4. claims: 12-14, 19, 20

   AMLCD wherein Cgs is individually tuned by varying the area of at least one of the overlaps between a TFT source electrode extension and a gate line in one the R, G, B pixels with respect to the others.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 00 3999

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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21-11-2008

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

专利名称(译)	有源矩阵显示基板具有根据颜色定制的子像素辅助电容		
公开(公告)号	EP1972989A3	公开(公告)日	2008-12-31
申请号	EP2008003999	申请日	2008-03-04
[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	SHIN KYOUNG JU KIM SHI YUL KIM JANG SOO		
发明人	SHIN, KYOUNG-JU KIM, SHI-YUL KIM, JANG-SOO		
IPC分类号	G02F1/1362 G09G3/36		
CPC分类号	G02F1/136213 G02F2001/136222 G02F2203/30 G09G2320/0242		
代理机构(译)	DR.威猛和合作伙伴		
优先权	1020070028785 2007-03-23 KR		
其他公开文献	EP1972989A2		
外部链接	Espacenet		

摘要(译)

在彩色有源矩阵LCD中，反冲电压Vkb（也称为馈通电压）可以在不同颜色的像素之间不同。在低灰度级电压下，反冲电压（在栅极关断时施加到液晶像素的电压的下降）变得特别显着：反冲电压的差异导致施加到那些像素的伽马电压的差异，导致不希望的色移。为了均衡反冲电压并消除色移，反冲电压所依赖的像素电容Cst或Cgs针对每种颜色单独定制。存储电容Cst形成在存储电极（STE）和像素电极（130）之间。电介质由a形成栅极绝缘层（113）。外涂层（116）和滤色器层（120）-位于薄膜晶体管基板（140）上。像素电极通过接触孔（STH）通过滤色器层与外涂层接触。滤色器仅对接触孔侧面的Cst电介质有贡献。可以通过改变STE区域，STE上接触孔的开口面积或两者来改变Cst。或者，通过从源电极提供突起（SEC），通过改变与TFT本身中的栅电极（GE）重叠的源电极（SE）的长度，可以改变寄生栅极，源电容Cgs。栅极线（DL）重叠不同量。

FIG. 1