



(11) **EP 1 993 090 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
20.10.2010 Bulletin 2010/42

(51) Int Cl.:
G09G 3/36^(2006.01) G02F 1/13^(2006.01)

(43) Date of publication A2:
19.11.2008 Bulletin 2008/47

(21) Application number: **08009004.6**

(22) Date of filing: **15.05.2008**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**
Designated Extension States:
AL BA MK RS

(72) Inventors:
• **Oke, Ryutaro**
Chiba-ken (JP)
• **Ono, Kikuo**
Chiba-ken (JP)

(30) Priority: **16.05.2007 JP 2007130624**

(74) Representative: **Beetz & Partner**
Patentanwälte
Steinsdorfstrasse 10
80538 München (DE)

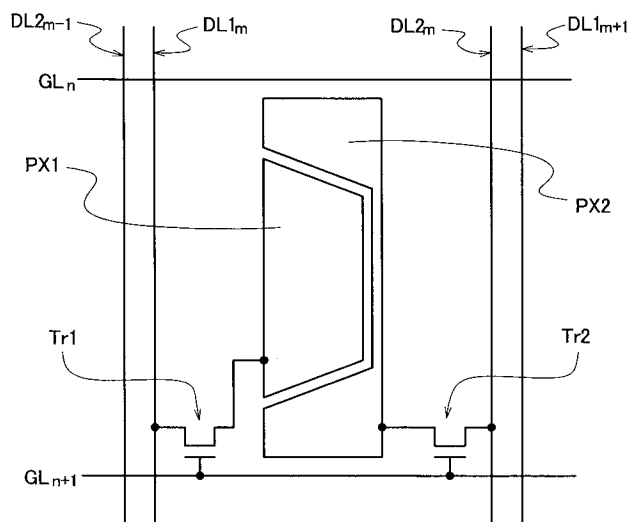
(71) Applicant: **Hitachi Displays, Ltd.**
Mobara-shi,
Chiba-ken (JP)

(54) **Liquid crystal display device**

(57) In a liquid crystal display device a display region is formed of a mass of pixels each having a first switching element (Tr1), a first pixel electrode (Px1) connected to the first switching element, a second switching element (Tr2), and a second pixel electrode (Px2) connected to the second switching element, the first switching element and the second switching element in one pixel are respectively connected with different video signal lines

(DL1,DL2), and the relationship between a potential of a signal applied to the first pixel electrode in one pixel and a potential of a signal applied to the counter electrode and the relationship between a potential of a signal applied to the second pixel electrode in the one pixel and the potential of the signal applied to the counter electrode during one frame period is set such that one relationship assumes the positive-polarity relationship and the other relationship assumes the negative-polarity relationship.

FIG. 2



EP 1 993 090 A3



EUROPEAN SEARCH REPORT

Application Number
EP 08 00 9004

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 2006/164350 A1 (KIM SUNG-MAN [KR] ET AL) KIM SUNG-MAN [KR] ET AL) 27 July 2006 (2006-07-27) * paragraphs [0004], [0087], [0088]; figures 2, 4 *	1,2	INV. G09G3/36 G02F1/13
A	US 2007/057297 A1 (KIM DONG-GYU [KR]) 15 March 2007 (2007-03-15) * paragraphs [0107] - [0131]; figures 2,7 *	1,2	
A	US 6 552 707 B1 (FUJIYOSHI TATSUMI [JP]) 22 April 2003 (2003-04-22) * column 5 - column 7; figure 2 *	1,2	
A,D	US 2007/008263 A1 (KIM DONG-GYU [KR]) 11 January 2007 (2007-01-11) * the whole document *	1,2	
X	US 2004/085495 A1 (ROH NAM-SEOK [KR] ET AL) 6 May 2004 (2004-05-06) * paragraphs [0002], [0047], [0091] - [0093], [0097] - [0099]; figures 1,13,16 *	3-7	TECHNICAL FIELDS SEARCHED (IPC) G09G
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 September 2010	Examiner Kunze, Holger
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			

 2
EPO FORM 1503 03.82 (P04C01)



Application Number

EP 08 00 9004

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).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 08 00 9004

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, 2

An LC display capable of performing polarity inversion with an alternating pattern in the direction perpendicular to the extending direction of the video signal lines.

2. claims: 3-7

An LC display capable of performing polarity inversion with an alternating pattern in the extending direction of the video signal lines which requires polarity inversion in the data driver only once per frame.

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

EP 08 00 9004

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-09-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2006164350	A1	27-07-2006	CN 1808250 A	26-07-2006
			JP 2006178461 A	06-07-2006
			KR 20060070336 A	23-06-2006

US 2007057297	A1	15-03-2007	CN 1932594 A	21-03-2007
			JP 2007079569 A	29-03-2007
			KR 20070029960 A	15-03-2007

US 6552707	B1	22-04-2003	JP 3504496 B2	08-03-2004
			JP 11326869 A	26-11-1999
			TW 512298 B	01-12-2002

US 2007008263	A1	11-01-2007	CN 1854831 A	01-11-2006
			JP 2006309239 A	09-11-2006
			KR 20060112043 A	31-10-2006

US 2004085495	A1	06-05-2004	AU 2002235010 A1	15-07-2003
			CN 1503921 A	09-06-2004
			JP 4202927 B2	24-12-2008
			JP 2005513572 T	12-05-2005
			WO 03056383 A1	10-07-2003
			KR 20030054280 A	02-07-2003
			TW 583435 B	11-04-2004

专利名称(译)	液晶显示装置		
公开(公告)号	EP1993090A3	公开(公告)日	2010-10-20
申请号	EP2008009004	申请日	2008-05-15
[标]申请(专利权)人(译)	株式会社日立显示器		
申请(专利权)人(译)	日立显示器有限公司.		
当前申请(专利权)人(译)	松下液晶显示CO., LTD. 日立显示器有限公司.		
[标]发明人	OKE RYUTARO ONO KIKUO		
发明人	OKE, RYUTARO ONO, KIKUO		
IPC分类号	G09G3/36 G02F1/13		
CPC分类号	G09G3/3648 G02F1/133707 G02F2001/134345 G09G3/3614 G09G2300/0443 G09G2300/0447 G09G2320/0247 G09G2330/021		
优先权	2007130624 2007-05-16 JP		
其他公开文献	EP1993090A2		
外部链接	Espacenet		

摘要(译)

在液晶显示装置中，显示区域由大量像素形成，每个像素具有第一开关元件（Tr1），连接到第一开关元件的第一像素电极（Px1），第二开关元件（Tr2）和连接到第二开关元件的第二像素电极（Px2），一个像素中的第一开关元件和第二开关元件分别与不同的视频信号线（DL1，DL2）连接，并且施加信号的电位之间的关系一个像素中的第一像素电极和施加到对电极的信号的电位以及施加到一个像素中的第二像素电极的信号的电位与施加到对电极的信号的电位之间的关系设置帧周期使得一个关系呈现正极性关系而另一个关系呈现负极性关系。

FIG. 2

