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(54) Low-power organic light emitting diode pixel circuit

(57) A pixel circuit comprises an organic light emitting diode (OLED), and a static memory for storing data that represents an operational state of the OLED. In alternative embodiments, a pixel circuit may include a complimentary metal oxide semiconductor (CMOS) circuit for controlling the OLED, a protection circuit for protecting the CMOS circuit from an over-voltage condition, and a current source with a field effect transistor (FET) having a static gate to source voltage that is greater than a threshold voltage of the FET.

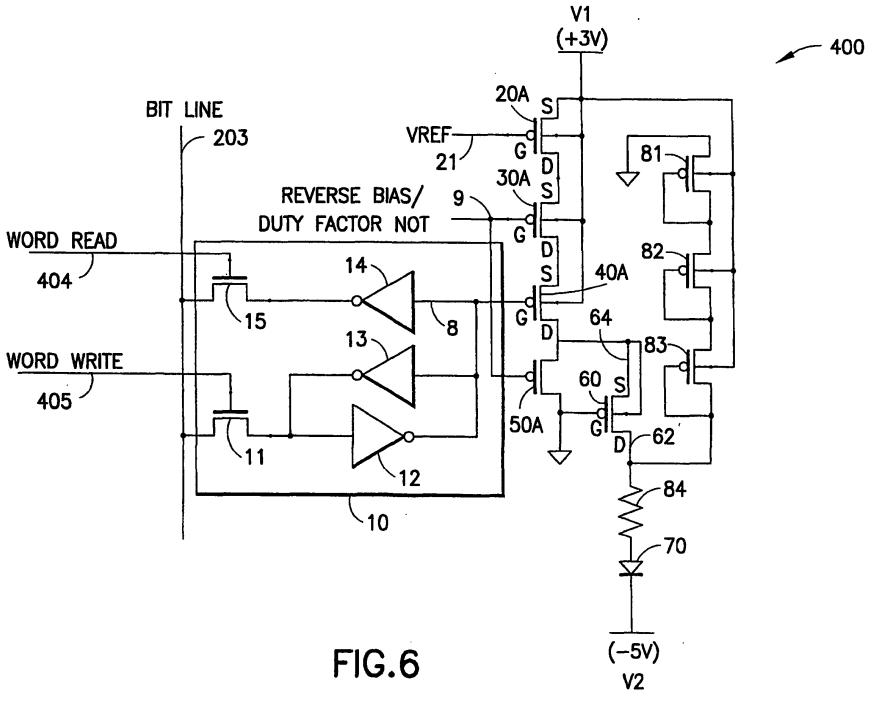

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 9722

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 Y	WO 99/38148 A1 (FED CORP [US]; PRACHE OLIVIER F [US]; HOWARD WEBSTER E [US]; MALAVIYA) 29 July 1999 (1999-07-29) * page 8, lines 1-11 * * page 13, line 27 - page 15, line 15; figure 8 *	1,2,4,5, 13,17,18 6-9,11, 14,15	INV. G09G3/32
Y	EP 1 063 630 A (SEMICONDUCTOR ENERGY LAB [JP]) 27 December 2000 (2000-12-27) * paragraphs [0017] - [0020], [0061] - [0063], [0105]; figures 1B,2 *	6-8,15	
Y	EP 0 845 770 A (TDK CORP [JP]) 3 June 1998 (1998-06-03) * page 3, line 3 - page 5, line 45; figure 1C *	6-8	
Y	EP 0 883 191 A (CANON KK [JP]) 9 December 1998 (1998-12-09) * page 9, lines 10-34; figure 10 *	9	TECHNICAL FIELDS SEARCHED (IPC)
Y	EP 1 061 497 A (SONY CORP [JP]) 20 December 2000 (2000-12-20) * paragraphs [0006], [0044], [0045], [0048] *	11,14,15	G09G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 January 2010	Harke, Michael

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

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 06 01 9722

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 06 01 9722

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: 1-6,13,17,18

   The first invention concernsa pixel circuit as claimed in claim 1, wherein the CMOS circuit comprises a current source, and a cascode device in an output stage of said CMOS circuit configured with a floating well.

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2. claims: 7,8

   The second invention concerns a pixel circuit as claimed in claim 1 further comprising a current limiting resistor in series with said OLED, wherein the resistor comprises thin film and/or undoped polysilicon.

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3. claims: 9,10

   The third invention concerns a pixel circuit as claimed in claim 1, wherein the CMOS circuit comprises a circuit for reverse biasing the OLED to remove trapped charge from the OLED.

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4. claims: 11,12,16

   The fourth invention concerns a pixel circuit as claimed in claim 1, wherein the CMOS circuit comprises a duty factor circuit for controlling an average current through the OLED.

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5. claims: 14,15

   The fifth invention concerns a pixel circuit as claimed in claim 1, wherein the CMOS circuit comprises a FET current source having a static gate to source voltage that is greater than a threshold voltage of the FET and /or a channel length that is greater than a channel width of the FET.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 01 9722

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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08-01-2010

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		US 6583775 B1	24-06-2003

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)	低功率有机发光二极管像素电路		
公开(公告)号	EP1732058A3	公开(公告)日	2010-02-17
申请号	EP2006019722	申请日	2001-12-21
[标]申请(专利权)人(译)	国际商业机器公司		
申请(专利权)人(译)	国际商业机器公司		
当前申请(专利权)人(译)	TPO DISPLAYS CORP.		
[标]发明人	SANFORD JAMES LAWRENCE SCHLIG EUGENE STEWART		
发明人	SANFORD, JAMES LAWRENCE SCHLIG, EUGENE STEWART		
IPC分类号	G09G3/32 H01L51/50 G09F9/30 G09G3/20 G09G3/30 G11C11/419 H01L27/32		
CPC分类号	G09G3/3233 G09G3/006 G09G3/2014 G09G3/3291 G09G2300/0809 G09G2300/0857 G09G2300/0861 G09G2310/0254 G09G2310/0256 G09G2310/063 G09G2320/0233 G09G2320/043 G09G2320/046 G09G2320/0626 G09G2320/0633 G09G2320/064 G09G2330/021 G09G2330/022 G09G2330/04 G11C11/419 H01L27/32		
优先权	09/754489 2001-01-04 US		
其他公开文献	EP1732058A2		
外部链接	Espacenet		

摘要(译)

像素电路包括有机发光二极管（OLED）和用于存储表示OLED的操作状态的数据的静态存储器。在替代实施例中，像素电路可包括用于控制OLED的互补金属氧化物半导体（CMOS）电路，用于保护CMOS电路免受过压状况影响的保护电路，以及具有场效应晶体管（FET）的电流源具有静态栅极到源极电压的电压大于FET的阈值电压。

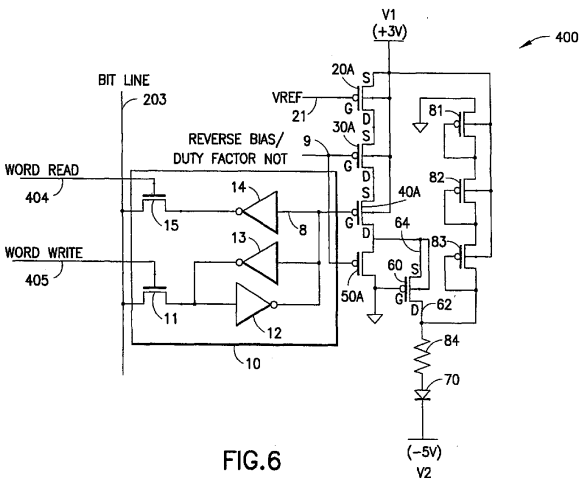

FIG.6