(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 January 2002 (31.01.2002)

PCT

(10) International Publication Number
WO 02/009178 A3

(51) International Patent Classification[7]: H01L 29/49, 21/28, 29/94

(21) International Application Number: PCT/US01/22660

(22) International Filing Date: 18 July 2001 (18.07.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/621,804 21 July 2000 (21.07.2000) US

(71) Applicant: **MOTOROLA, INC.** [US/US]; 1303 East Algonquin Road, Schaumburg, , IL 60196 (US).

(72) Inventors: **SAMAVEDAM, Srikanth, B.**; 2913 Bernardino Cove, Austin, TX 78728 (US). **TOBIN, Philip, J.**; 11410 Windermere, Austin, TX 78759 (US). **TAYLOR, William, J., Jr.**; 1905 Cedar Bend Drive, Round Rock, TX 78681 (US).

(74) Agents: **CHASTAIN, Lee, E.**; Motorola, Inc., Corporate Law Department, 7700 West Parmer Lane, MD: TX32/PL02, Austin, TX 78729 et al. (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

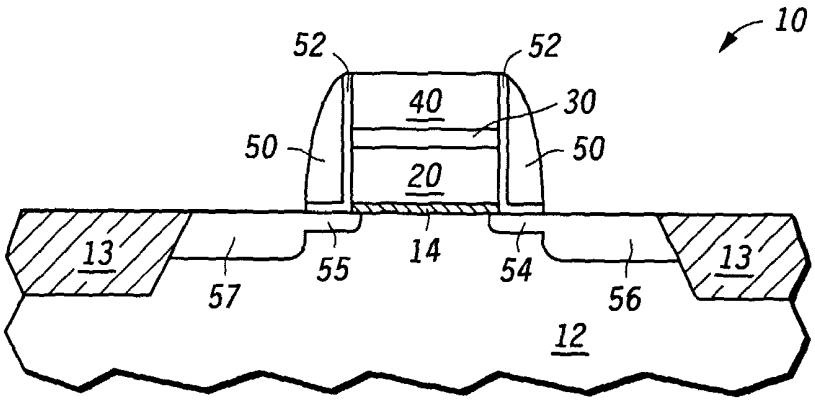
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
10 October 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SEMICONDUCTOR DEVICE AND A PROCESS FOR FORMING THE SAME



(57) Abstract: A semiconductor device (10) has a conductor that overlies an insulating layer (14) and has a first conductive portion (20), a second conductive portion (30), and a third conductive portion (40). The second conductive portion (30) lies between the first (20) and third conductive (40) portions. The first conductive portion (20) has a first element, and the third conductive portion (40) includes a metal and silicon without a significant amount of the first element. The conductor may be a gate electrode or a capacitor electrode.

WO 02/009178 A3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/22660

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L29/49 H01L21/28 H01L29/94

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 719 410 A (AKASAKA YASUSHI ET AL) 17 February 1998 (1998-02-17) column 13, line 16 - line 32 column 15, line 59 - line 63; figures 10A-10D	1-31
A	WO 99 43024 A (COMMISSARIAT ENERGIE ATOMIQUE ;BENSAHEL DANIEL (FR); CAMPIDELLI YV) 26 August 1999 (1999-08-26) figures 1A-1G	1-31
A	WO 98 13880 A (ADVANCED MICRO DEVICES INC) 2 April 1998 (1998-04-02) page 14, line 5 - line 19; claims 2,3; figure 3	1-31

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2002	04/07/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Juhl, A

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	UEJIMA K ET AL: "HIGHLY RELIABLE POLY-SIGE/AMORPHOUS-SI GATE CMOS" INTERNATIONAL ELECTRON DEVICES MEETING 2000. IEDM. TECHNICAL DIGEST. SAN FRANCISCO, CA, DEC. 10 - 13, 2000, NEW YORK, NY: IEEE, US, 10 December 2000 (2000-12-10), pages 445-448, XP000988878 ISBN: 0-7803-6439-2 figure 1A	1,11,21
A	CHANG C L ET AL: "POLYCRYSTALLINE SI1-X-YGEXCY FOR SUPPRESSION OF BORON PENETRATION IN PMOS STRUCTURES" MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS, MATERIALS RESEARCH SOCIETY, PITTSBURG, PA, US, vol. 525, 1998, pages 213-218, XP000826560 ISSN: 0272-9172 page 213, paragraph 1	1
P,X	WO 00 77828 A (KONINKL PHILIPS ELECTRONICS NV) 21 December 2000 (2000-12-21) page 11, line 10 -page 12, line 17; claim 13	1-31
P,X	EP 1 111 686 A (SEIKO EPSON CORP) 27 June 2001 (2001-06-27) figure 2	1,3,9, 11,13, 19,21, 23,24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 01/22660

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5719410 A	17-02-1998	JP 8102462 A	16-04-1996
		JP 7235542 A	05-09-1995
		US 6100193 A	08-08-2000
		KR 179677 B1	15-04-1999
WO 9943024 A	26-08-1999	FR 2775119 A1	20-08-1999
		EP 0976149 A1	02-02-2000
		WO 9943024 A1	26-08-1999
		JP 2002510438 T	02-04-2002
		US 6255149 B1	03-07-2001
WO 9813880 A	02-04-1998	WO 9813880 A1	02-04-1998
WO 0077828 A	21-12-2000	WO 0077828 A2	21-12-2000
		EP 1138058 A2	04-10-2001
EP 1111686 A	27-06-2001	EP 1111686 A1	27-06-2001
		WO 0079601 A1	28-12-2000