

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
19 February 2004 (19.02.2004)

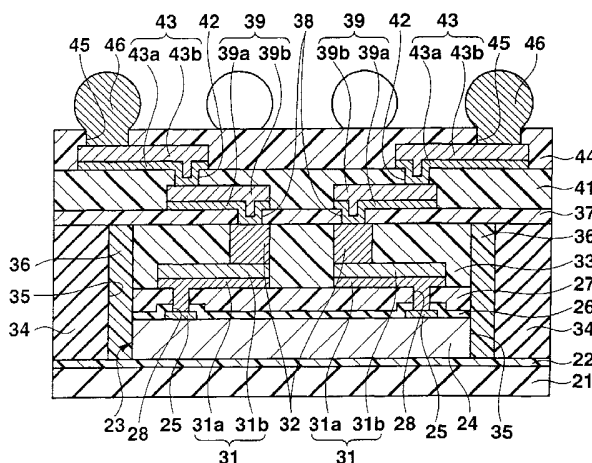
PCT

(10) International Publication Number
WO 2004/015771 A3

- (51) International Patent Classification⁷: **H01L 23/538**, 25/10, 23/31
- (21) International Application Number:
PCT/JP2003/009958
- (22) International Filing Date: 5 August 2003 (05.08.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2002-232289 9 August 2002 (09.08.2002) JP
2002-232737 9 August 2002 (09.08.2002) JP
2002-254695 30 August 2002 (30.08.2002) JP
- (71) Applicant (for all designated States except US): **CASIO COMPUTER CO., LTD.** [JP/JP]; 6-2, Hon-machi 1-chome, Shibuya-ku, Tokyo 151-8543 (JP).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **JOBETTO, Hiroyasu** [JP/JP]; 1-9-1-610, Kuboyamacho, Hachioji-shi, Tokyo 192-0023 (JP). **MIHARA, Ichiro** [JP/JP]; 6-4-10-505, Nishikicho, Tachikawa-shi, Tokyo 190-0022 (JP).
- (74) Agents: **SUZUYE, Takehiko** et al.; c/o SUZUYE & SUZUYE, 7-2, Kasumigaseki 3-chome, Chiyoda-ku, Tokyo 100-0013 (JP).
- (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, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, 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:
8 July 2004

[Continued on next page]

(54) Title: SEMICONDUCTOR DEVICE AND METHOD OF MANUFACTURING THE SAME



(57) Abstract: A semiconductor device includes a semiconductor construction assembly (23) having a semiconductor substrate (24) which has first and second surfaces, and has an integrated circuit element formed on the first surface, a plurality of connection pads (25) which are connected to the integrated circuit element, a protective layer (27) which covers the semiconductor substrate and has openings (28) for exposing the connection pads (25), and conductors (31) which are connected to the connection pads (25), arranged on the protective layer (27), and have pads. An upper insulating layer (37) covers the entire upper surface of the semiconductor construction assembly (23) including the conductors (31) except the pads. A sealing member (34 or 36) covers at least one side surface of the semiconductor construction assembly (23). An upper conductors (43) is formed on the upper insulating layer, and has one ends electrically connected to the pads and an external connection pads, respectively, an external connection pad of at least one of the upper conductors being disposed in a region corresponding to the sealing member.



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.

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L23/538 H01L25/10 H01L23/31

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)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 27786 A (IBIDEN CO LTD ;WANG DONGDONG (JP); SAKAMOTO HAJIME (JP)) 4 April 2002 (2002-04-04) abstract; figures 1-69 & EP 1 321 980 A (IBIDEN CO LTD) 25 June 2003 (2003-06-25) embodiments 1-5 ---	1-19, 22-38
X	US 6 159 767 A (EICHELBERGER CHARLES WILLIAM) 12 December 2000 (2000-12-12) column 8, line 62 -column 15, line 15; figures 5-9 ---	1-38
X	WO 92 17901 A (INTEGRATED SYSTEM ASSEMBLIES) 15 October 1992 (1992-10-15) abstract; figures 1-32 ---	1-38
	--- -/--	

☒ Further documents are listed in the continuation of box C.☒ 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

29 March 2004

Date of mailing of the international search report

06/04/2004

Name and mailing address of the ISA

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

Authorized officer

Schumacher, H

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 03/09958

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 423 570 B1 (MA QING ET AL) 23 July 2002 (2002-07-23) column 3, line 38 -column 7, line 33; figures 1-17	1-5, 8-15, 17, 22-38
X	US 6 154 366 A (LI JIAN ET AL) 28 November 2000 (2000-11-28) abstract; figures 1-4	1-4, 7-10, 15-17, 22-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 03/09958

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0227786	A	04-04-2002	CN 1466777 T	07-01-2004
			EP 1321980 A1	25-06-2003
			WO 0227786 A1	04-04-2002
			JP 2002170840 A	14-06-2002
			TW 546999 B	11-08-2003
			US 2004014317 A1	22-01-2004
			JP 2002170827 A	14-06-2002
			JP 2002246756 A	30-08-2002
			JP 2002246504 A	30-08-2002
			JP 2002246757 A	30-08-2002
			JP 2002246761 A	30-08-2002
US 6159767	A	12-12-2000	US 5841193 A	24-11-1998
WO 9217901	A	15-10-1992	AU 648417 B2	21-04-1994
			AU 1874392 A	02-11-1992
			CA 2106872 A1	28-09-1992
			EP 0577779 A1	12-01-1994
			JP 6502744 T	24-03-1994
			WO 9217901 A1	15-10-1992
			US 5250843 A	05-10-1993
US 6423570	B1	23-07-2002	US 2002127780 A1	12-09-2002
			US 2002127769 A1	12-09-2002
US 6154366	A	28-11-2000	NONE	