

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 July 2008 (31.07.2008)

PCT

(10) International Publication Number
WO 2008/091221 A3

(51) International Patent Classification:

B81B 7/00 (2006.01) HO1L 23/043 (2006.01)
B81C 3/00 (2006.01)

(21) International Application Number:

PCT/SE2008/050093

(22) International Filing Date: 25 January 2008 (25.01.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

0700172-0 25 January 2007 (25.01.2007) SE

(71) Applicant (for all designated States except US): **SILEX MICROSYSTEMS AB** [SE/SE]; Box 595, S-175 26 Jarfalla (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **EBEFORS, Thorbjörn** [SE/SE]; Kallkarrsvagen 28, S-141 41 Huddinge (SE). **KÄLVESTEN, Edvard** [SE/SE]; Edelcrantzvagen 20, S-129 38 Hagersten (SE). **BAUER, Tomas** [SE/SE]; Kronborgsgrand 14, S-164 46 Kista (SE).

(74) Agent: **BRANN AB**; Box 1344, S-75 1 43 Uppsala (SE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, **DK**, EE, ES, FI, FR, GB, GR, **HR**, HU, IE, **IS**, **IT**, LT, LU, LV, MC, MT, NL, NO, PL, PT, **RO**, SE, **SI**, SK, TR), OAPI (BF, **BJ**, CF, CG, CI, CM, GA, GN, GQ, GW, ML, **MR**, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report

[Continued on next page]

(54) Title: MICROPACKAGING METHOD AND DEVICES

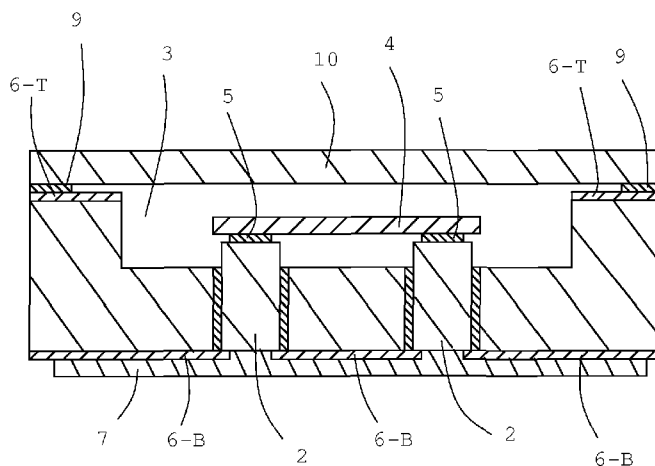


Fig . 1

(57) Abstract: The invention relates in one aspect to a method of micro-packaging a component. At least a first and a second semi-conductor substrate are provided, one of which has electrical through connections (vias). A depression in either one of said substrates or in both is etched. A component is provided above vias and connected thereto. The substrates are joined to form a sealed package. The invention also relates to a micro-packaged electronic or micromechanic device, comprising a thin-walled casing of a semi-conductor material having electrical through connections through the bottom of the casing. An electronic or micromechanic component is attached to said electrical through connections, and the package is hermetically sealed for maintaining a desired atmosphere, suitably vacuum inside the box.

WO 2008/091221 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

18 September 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2008/050093

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
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: H01L, H05K, B81C, B81B

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category ¹⁾	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20050127499 A1 (HARNEY, K P ET), 16 June 2005 (16.06.2005), figures 2,5, abstract, paragraphs (0006)-(0009);(0022)-(0024);(0028);(0033);(0038); (0043)	1-3,8-9, 12-16,20-21 , 23-25,28-34, 39-42
Y	--	4-5,10-11 ,22
X	EP 1433742 A2 (SHINKO ELECTRIC IND CO), 30 June 2004 (30.06.2004), figures 3,16, abstract, paragraphs (0024)-(0026); (0056)-(0057)	6-7,17, 19,26
X	EP 1688994 A1 (SAMSUNG ELECTRONICS CO, LTD), 9 August 2006 (09.08.2006), figure 1, abstract, paragraphs (0005); (0009); (0019)	27

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

☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

28 May 2008

Date of mailing of the international search report

14 -07- 2008

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Bo Gustavsson / J A A
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
SE2008/050093

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The following separate inventions were identified:

1 : Claims 1-34, 39-42 directed to a method and device of micro packaging of electronic and/or MEMS devices .

2 : Claim 35-38 directed to the layout of a via structure.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: **1 - 34 , 39 - 42**

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2008/050093

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 20050218488 A1 (MATSUO, M), 6 October 2005 (06.10.2005), figures 2a-f, 4b, abstract --	4-5, 10-11, 22
X	US 7067397 B1 (CHANG-CHIEN, P P ET AL), 27 June 2006 (27.06.2006), figure 1f, abstract --	30-31, 33
A	US 20040259325 A1 (GAN, Q), 23 December 2004 (23.12.2004), abstract --	1-34, 39-42
A	WO 03054927 A2 (THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ARKANSAS), 3 July 2003 (03.07.2003), figure 6, abstract -- -----	1-34, 39-42

International patent classification (IPC)**B81B 7/00** (2006.01)**B81C 3/00** (2006.01)**H01L 23/043** (2006.01)**Download your patent documents at www.pry.se**

The cited patent documents can be downloaded at www.prv.se by following the links:

- In English/Searches and advisory services/Cited documents (service in English) or
- e-tjänster/anfärda dokument (service in Swedish).

Use the application number as username.

The password is **RKRZC JKXP S**.

Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

26/01/2008

International application No.

PCT/SE2008/050093

us	20050127499	A1	16/06/2005	CN	1906120	A	31/01/2007
				EP	1708959	A	11/10/2006
				JP	2007513796	T	31/05/2007
				US	6936918	B	30/08/2005
				US	7034393	B	25/04/2006
				US	20050127525	A	16/06/2005
				US	20050170609	A	04/08/2005
				US	20060118946	A	08/06/2006
				WO	2005058749	A	30/06/2005
				CN	1652302	A	10/08/2005
				CN	1953933	A	25/04/2007
				EP	1737786	A	03/01/2007
				JP	2007532338	T	15/11/2007
				WO	2005102911	A	03/11/2005

EP	1433742	A2	30/06/2004	JP	2004209585	A	29/07/2004
				KR	20040060733	A	06/07/2004
				US	20050167795	A	04/08/2005

EP	1688994	A1	09/08/2006	JP	2006216963	A	17/08/2006
				KR	100594952	B	22/06/2006
				US	20060175707	A	10/08/2006

US	20050218488	A1	06/10/2005	CN	1677705	A	05/10/2005
				JP	3875240	B	31/01/2007
				JP	2005294462	A	20/10/2005
				TW	254343	B	01/05/2006
				US	7053456	B	30/05/2006
				US	20060157808	A	20/07/2006

US	7067397	B1	27/06/2006	WO	2007001524	A	04/01/2007

US	20040259325	A1	23/12/2004	NONE			

WO	03054927	A2	03/07/2003	AU	2002365151	A	09/07/2003
				US	7049175	B	23/05/2006
				US	20050006738	A	13/01/2005
				US	20060211177	A	21/09/2006
