



(51) International Patent Classification:  
*H01L 23/495* (2006.01) *H01L 23/12* (2006.01)  
*H01L 23/48* (2006.01)

(21) International Application Number:  
PCT/US2009/034368

(22) International Filing Date:  
18 February 2009 (18.02.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/029,617 19 February 2008 (19.02.2008) US  
12/199,667 27 August 2008 (27.08.2008) US

(71) Applicant (for all designated States except US): **VERTICAL CIRCUITS, INC.** [US/US]; 10 Victor Square, Scotts Valley, CA 95066 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ANDREWS, Lawrence, Douglas** [US/US]; 22545 Old Santa Cruz Highway, Los Gatos, CA 95033 (US). **LEAL, Jeffrey, S.** [US/US]; 1010 Pacific Ave, #313, Santa Cruz, CA 95060 (US). **MCELREA, Simon, J., S.** [GB/US]; 86 Tan Oak Drive, Scotts Valley, CA 95066 (US).

(74) Agents: **KENNEDY, Bill** et al.; Haynes Beffel & Wolfeld LLP, P.O. Box 366, Half Moon Bay, CA 94019 (US).

(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, ST, 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, MK, 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).

**Published:**

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:  
22 October 2009

(54) Title: FLAT LEADLESS PACKAGES AND STACKED LEADLESS PACKAGE ASSEMBLIES

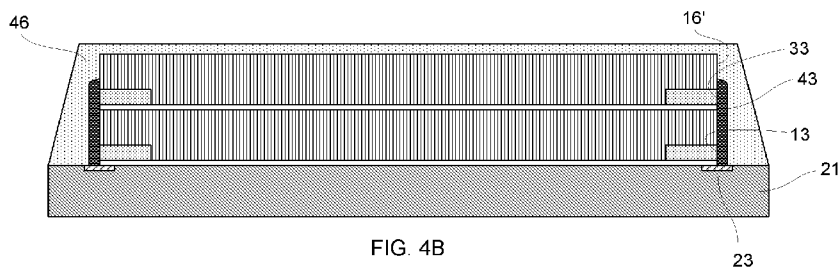


FIG. 4B

(57) Abstract: A flat leadless package includes at least one die mounted onto a leadframe and electrically connected to leads using an electrically conductive polymer or an electrically conductive ink. Also, an assembly includes stacked leadless packages electrically connected to leads using an electrically conductive polymer or an electrically conductive ink. Also, a package module includes an assembly of stacked leadless packages mounted on a support and electrically connected to circuitry in the support using an electrically conductive polymer or an electrically conductive ink.



## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2009/034368****A. CLASSIFICATION OF SUBJECT MATTER****H01L 23/495(2006.01)i, H01L 23/48(2006.01)i, H01L 23/12(2006.01)i**

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

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

Korean Utility Models and application for Utility Models since 1975  
Japanese Utility Models and application for Utility Models since 1975

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

eKOMPASS (KIPO internal) &amp; keyword : package and leadless

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category*   | Citation of document, with indication, where appropriate, of the relevant passages                                                  | Relevant to claim No.                                |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| X<br>Y<br>A | US 2007-0252262 A1 (MARE ROBINSON et al.) 01 NOVEMBER 2007<br>See the abstract, [0026], [0027], [0035], [0037], [0038] and figure 6 | 1-14<br>20, 23, 29, 33, 34<br>15, 16                 |
| X<br>Y      | US 6225689 B1 (WALTER L., MODEN et al.) 01 MAY 2001<br>See the abstract, column 5, lines 46-48, claim 1 and figure 9                | 17-19, 21, 22, 24-28,<br>30-32<br>20, 23, 29, 33, 34 |

☐ Further documents are listed in the continuation of Box C.☒ See patent family 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 application or patent 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 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

26 AUGUST 2009 (26.08.2009)

Date of mailing of the international search report

**26 AUGUST 2009 (26.08.2009)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
Government Complex-Daejeon, 139 Seonsa-ro, Seo-  
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KWON, Yongkyong

Telephone No. 82-42-481-5800



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2009/034368**

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 2007-0252262 A1                        | 01.11.2007          | US 7535109 B2              | 19.05.2009          |
|                                           |                     | US 2005-0258530 A1         | 24.11.2005          |
|                                           |                     | US 7245021 B2              | 17.07.2007          |
| <hr/>                                     |                     |                            |                     |
| US 6225689 B1                             | 01.05.2001          | US 6153929 A               | 28.11.2000          |
|                                           |                     | US 2008-0003712 A1         | 03.01.2008          |
|                                           |                     | US 6486546 B2              | 26.11.2002          |
|                                           |                     | US 6258623 B1              | 10.07.2001          |
|                                           |                     | US 6362519 B2              | 26.03.2002          |
|                                           |                     | US 6475831 B2              | 05.11.2002          |
|                                           |                     | US 6686655 B2              | 03.02.2004          |
|                                           |                     | US 6773955 B2              | 10.08.2004          |
|                                           |                     | US 2001-0006829 A1         | 05.07.2001          |
|                                           |                     | US 2001-0020740 A1         | 13.09.2001          |
|                                           |                     | US 2002-0084520 A1         | 04.07.2002          |
|                                           |                     | US 2002-0182772 A1         | 05.12.2002          |
|                                           |                     | US 2002-0185725 A1         | 12.12.2002          |
|                                           |                     | US 2004-0168316 A1         | 02.09.2004          |
|                                           |                     | US 2005-0158912 A1         | 21.07.2005          |
|                                           |                     | US 2006-0252180 A1         | 09.11.2006          |
| <hr/>                                     |                     |                            |                     |