



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

<p>(51) International Patent Classification <sup>7</sup> : <b>H01L 23/13, 23/538, 25/15, 25/16</b></p>	<p><b>A3</b></p>	<p>(11) International Publication Number: <b>WO 00/04595</b></p> <p>(43) International Publication Date: 27 January 2000 (27.01.00)</p>
<p>(21) International Application Number: PCT/US99/16067</p> <p>(22) International Filing Date: 16 July 1999 (16.07.99)</p> <p>(30) Priority Data: 09/119,410 20 July 1998 (20.07.98) US</p> <p>(71) Applicant: INTEL CORPORATION [US/US]; 2200 Mission College Boulevard, P.O. Box 58119, Santa Clara, CA 95052 (US).</p> <p>(72) Inventor: BURTON, Edward, A.; 679 N.E. Valarie Court, Hillsboro, OR 97124 (US).</p> <p>(74) Agents: O'DOWD, Shawn, W. et al.; Kenyon &amp; Kenyon, Suite 600, 333 W. San Carlos Street, San Jose, CA 95110 (US).</p>		<p>(81) Designated States: CN, DE, GB, KR, MX, SG.</p> <p><b>Published</b> <i>With international search report.</i></p> <p>(88) Date of publication of the international search report: 29 June 2000 (29.06.00)</p>
<p>(54) Title: LAND-SIDE MOUNTING OF COMPONENTS TO AN INTEGRATED CIRCUIT PACKAGE</p>		
<p>(57) Abstract</p> <p>A method and apparatus is presented to allow one or more electrical components to be coupled to the land-side of an integrated circuit package coupled to a circuit board. In a first embodiment, a void is provided in the circuit board, and a peripheral area of the integrated circuit package is coupled to a peripheral area around the void. This provides space for the insertion of components in the land-side of the integrated circuit package. In a second embodiment, a spacer is provided coupled to the peripheral area of the integrated circuit package to allow the insertion of components into the land-side of the package and above the circuit board. With these embodiments of the present invention, components, such as decoupling capacitors can be coupled closer to the die (e.g. a processor die) of the package thus reducing parasitic inductance.</p>		

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/16067

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 H01L23/13 H01L23/538 H01L25/15 H01L25/16

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 646 828 A (DEGANI YINON ET AL) 8 July 1997 (1997-07-08) column 6, line 56 -column 7, line 26; figure 6	1-4, 16
X	---	
X	EP 0 729 180 A (AT & T CORP) 28 August 1996 (1996-08-28) abstract; figure 3	1-4, 16
A	---	
A	US 4 754 366 A (HERNANDEZ JORGE M) 28 June 1988 (1988-06-28) abstract column 1, line 20 - line 54 figures 9,10,15	3
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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
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- "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

11 January 2000

Date of mailing of the international search report

**26 JAN 2000**

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INTERNATIONAL SEARCH REPORT

Interr. Appl. Application No  
PCT/US 99/16067

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 822 595 A (TAIYO YUDEN KK) 4 February 1998 (1998-02-04) column 3, line 35 -column 4, line 49; figure 1 ---	5-15,17, 18
A	EP 0 645 811 A (TOKYO SHIBAURA ELECTRIC CO) 29 March 1995 (1995-03-29) figure 1A -----	6,8,9, 11,12,14

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 99/16067

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional sheet

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.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4,16

Electronic circuit assembly, and method of manufacturing the same, comprising an integrated circuit package having a land-side, said land-side being adapted to be coupled to an electrical component as well as to a circuit board, characterized in that said circuit board has a void and that said integrated circuit package is adapted to be coupled to said printed circuit board at a peripheral area around said void.

2. Claims: 5-15,17-18

Electronic circuit assembly, and method of manufacturing the same, comprising an integrated circuit package having a land-side, said land-side being adapted to be coupled to an electrical component as well as to a circuit board, characterized in that said land-side has a peripheral area to which a spacer is coupled, said spacer being adapted to be coupled to said circuit board.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/16067

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