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**Declarations under Rule 4.17:**

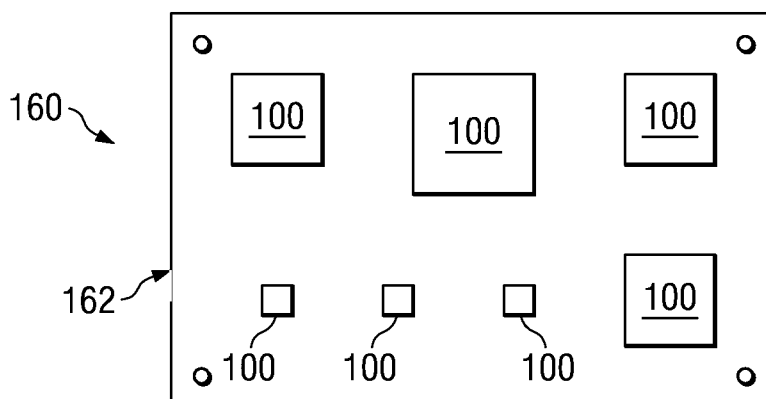
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(U))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(Hi))

**Published:**

- with international search report

(88) Date of publication of the international search report:  
14 August 2008

(54) Title: PIN ARRAY NO LEAD PACKAGE AND ASSEMBLY METHOD THEREOF



**FIG. 14**

(57) Abstract: A microelectronics package (100) comprising: a die (112), a lead frame (120) comprising: a substrate (110) having a first side and a second side, an array of contacts (108) positioned on the first side and the second side, and an aperture extending through the substrate between the contacts, wherein at least one contact is electrically coupled to the die, and a mold compound (104) encapsulating the die and the substrate.

WO 2008/042930 A3

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/Q80251

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01 L 23/495 (2008.04)

USPC - 257/676

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(8) - H01 L 23/495 (2008.04)

USPC - 257/676, 667, 787

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 practicable, search terms used)

USPTO EAST System (US, USPG-PUB, USOCR), MicroPatent

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 6,025,640 A (YAGI et al) 15 February 2000 (15.02.2000) entire document	1, 3, 5-9 ----- 2, 4
Y	US 6,498,392 B2 (AZUMA) 24 December 2002 (24.12.2002) entire document	2
Y	US 6,762,118 B2 (LIU et al) 13 July 2004 (13.07.2004) entire document	4
A	US 6,740,961 B1 (MOSTAFAZADEH) 25 May 2004 (25.05.2004) entire document	1-9
A	US 6,710,430 B2 (MINAMIO et al) 23 March 2004 (23.03.2004) entire document	1-9
A	US 6,630,729 B2 (HUANG) 07 October 2003 (07.10.2003) entire document	1-9
A	US 6,528,879 B2 (SAKAMOTO et al) 04 March 2003 (04.03.2003) entire document	1-9
A	US 5,767,580 A (ROSTOKER) 16 June 1998 (16.06.1998) abstract; column 15, lines 10-34; figure 10	1-9

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

## D

\* 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 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

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

Date of the actual completion of the international search

13 April 2008

Date of mailing of the international search report

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Name and mailing address of the ISA/US

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/080251

## 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 **D** 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. IH 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:

See extra 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 additional fees, this Authority did not invite payment of additional fees.
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.:  
1-9

### 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 N<sup>o</sup>.

PCT/US2007/080251

Continuation of Box III.

Group I, claims 1-9, drawn to a lead frame comprising a substrate having an array of contacts positioned on the first and second sides and an aperture extending through the substrate between the contacts in the arrays.

Group II, claims 10-14, drawn to a manufacturing process comprising attaching a die to a lead frame comprising a substrate having an array of contacts positioned on the first and second sides; encapsulating the die in a mold compound; and singulating the contacts such that at least one of the contacts is electrically isolated from the other contacts.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: an aperture extending through the substrate between the contacts in the arrays as claimed therein is not present in the invention of Group II. The special technical feature of the Group II invention: singulating the contacts such that at least one of the contacts is electrically isolated from the other contacts as claimed therein is not present in the invention of Group I.

The limitation of "a microelectronics package comprising a lead frame having a substrate having an array of contacts positioned on the first and second sides and an aperture extending through the substrate between the contacts in the arrays and encapsulating the a die and the leadframe" is not considered a novel linking special technical feature as this limitation is clearly disclosed by US 5,767,580 A (ROSTOKER), 16 June 1998, abstract; column 15, lines 10-34; figure 10.

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.