Title: CHIP-LAST EMBEDDED INTERCONNECT STRUCTURES AND METHODS OF MAKING THE SAME

Abstract: CHIP-LAST EMBEDDED INTERCONNECT STRUCTURES AND METHODS OF MAKING THE SAME ABSTRACT The various embodiments of the present invention provide a novel chip-last embedded structure, wherein an IC is embedded within a one to two metal layer substrate. The various embodiments of the present invention are comparable to other two-dimensional and three-dimensional WLFO packages of the prior art as the embodiments have similar package thicknesses and X-Y form factors, short interconnect lengths, fine-pitch interconnects to chip I/Os, a reduced layer count for redistribution of chip I/O pads to ball grid arrays (BGA) or land grid arrays (LGA), and improved thermal management options.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H01 L 21/50, 23/48 (2012.01)
USPC - 257/773; 257/E21 499

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)
USPC: 257/773; 257/E21 499

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 257/773; 257/E21 499; 257/E23.011 . 438/107 (keyword limited-see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(PGPB, USPT, EPAB, JPAB); Google Scholar
Search Terms Used: embedded integrated circuit package cavity dielectric substrate pads redistribution IC fill above below interconnect cu copper bump bumpless thickness redistribution redistribution layer via

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 2008/01 16569 A1 (HUANG et al.) 22 May 2008 (22.05.2008), Abstract, ara (0006), [0009], [0015], [0019], [0022], [0028], [0032], [0036]-[0037], Fig. 11</td>
<td>1-26</td>
</tr>
<tr>
<td>Y</td>
<td>US 2008/0308917 A1 (PRESSEL et al.) 18 December 2008 (18.12.2008), para [0022], [0033], [0036]-[0039], [0041], [0043]-[0044], [0046]-[0047], [0050]-[0051], [0047], claim 42, claim 43, Fig. 2</td>
<td>1-26</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* 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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"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
06 June 2012 (06.06.2012)

Date of mailing of the international search report
19 JUN 2012

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