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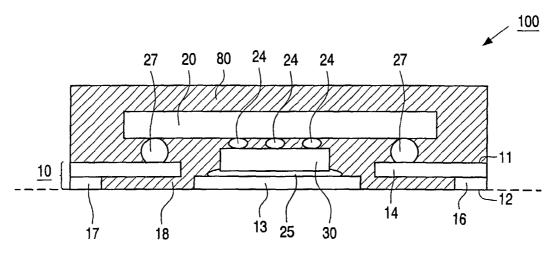
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[Continued on next page]

(54) Title: ELECTRONIC DEVICE AND METHOD OF MANUFACTURING SAME



(57) Abstract: The electronic device (100) is a chip-on-chip construction on a lead frame (10) comprising a heat sink (13) in an encapsulation (80). The first chip (20) and the second chip (30) are mutually connected by first conductive interconnections (24) and the first chip (20) is connected to the lead frame (10) by second conductive interconnections (27) which preferably have a lower reflow temperature than the first conductive interconnections (24). By heating the device (100) the adhesive layer (25) will first shrink, causing a stress, which will be relaxated by reflowing the second conductive interconnections (27).

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B. FIELDS SEARCHED

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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)

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Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/093087 A1 (PAEK JONG SIK) 18 July 2002 (2002-07-18) the whole document	1,8
А	US 2002/105789 A1 (CHAN LIEN-CHIH ET AL) 8 August 2002 (2002-08-08) the whole document 	1,8
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 09, 30 September 1996 (1996-09-30) -& JP 08 125112 A (HITACHI LTD; HITACHI VLSI ENG CORP), 17 May 1996 (1996-05-17) the whole document/	1,8

Y Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document 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. "&" document member of the same patent family
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C.(Continua Category °	ation) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
Calegory	Ollation of document, with indication, where appropriate, of the relevant passages		
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 125 (E-1050), 27 March 1991 (1991-03-27) -& JP 03 011747 A (TOSHIBA CORP), 21 January 1991 (1991-01-21) the whole document	1,8	
Α	US 6 337 510 B1 (CHUN-JEN SU ET AL) 8 January 2002 (2002-01-08) column 4, line 3 - line 25; figure 6	1,8	
А	DE 100 41 695 A (ORIENT SEMICONDUCTOR ELECTRONI) 7 March 2002 (2002-03-07) the whole document	1,8	
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) -& JP 11 054695 A (SANYO ELECTRIC CO LTD), 26 February 1999 (1999-02-26) abstract; figure 3	1,2,8	

INTERNATIONAL SEARCH REPORT

rnational Application No
PCT/IB 03/05976

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 2002093087	A1	18-07-2002	KR 2	2002061225 A	24-07-2002
US 2002105789	A1	08-08-2002	NONE		
JP 08125112	Α	17-05-1996	NONE		
JP 03011747	A	21-01-1991	NONE		
US 6337510	B1	08-01-2002	NONE		
DE 10041695	A	07-03-2002	DE	10041695 A1	07-03-2002
JP 11054695	Α	26-02-1999	NONE		