

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 May 2002 (10.05.2002)

PCT

(10) International Publication Number
WO 02/037248 A3

(51) International Patent Classification⁷: **H05K 1/14**,
7/02, G05F 1/46, H02M 3/156

(21) International Application Number: PCT/US01/48496

(22) International Filing Date: 30 October 2001 (30.10.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/244,399 30 October 2000 (30.10.2000) US
09/809,826 16 March 2001 (16.03.2001) US

(71) Applicant: **SUN MICROSYSTEMS, INC.** [US/US]; 901
San Antonio Road, M/S: UPAL O1-521, Palo Alto, CA
94303 (US).

(72) Inventors: **SMITH, Larry, D.**; 6339 Solano Drive,
San Jose, CA 95119-1554 (US). **NOVAK, Istvan**; 81
Apple Ridge Road, Maynard, MA 01754 (US). **FREDA,**
Michael, C.; 2465 Fountain Oaks Drive, Morgan Hill, CA
95037 (US).

(74) Agents: **KIVLIN, B., Noel** et al.; Conley, Rose & Tayon,
P.C., P.O. Box 398, Austin, TX 78767-0398 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI,
SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA,
ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,
CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,
TG).

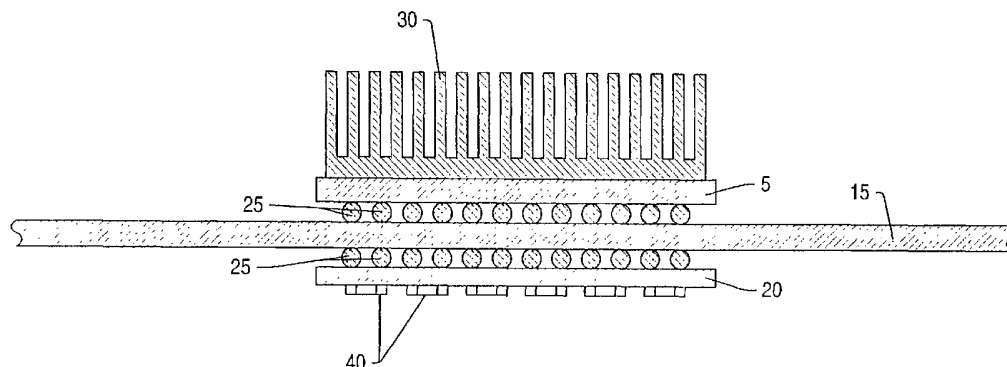
Published:

— with international search report

(88) Date of publication of the international search report:
16 January 2003

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: A POWER DISTRIBUTION SYSTEM WITH A DEDICATED POWER STRUCTURE AND A HIGH PERFOR-
MANCE VOLTAGE REGULATOR



(57) Abstract: A system and method for distributing power to an integrated circuit. in one embodiment, a power laminate (20) may be mounted to a printed circuit board (PCB) (15). The integrated circuit (5) for which power is to be distributed may be electrically coupled to the PCB. The power laminate (20) may include one or more power planes and one or more reference (i.e. ground) planes, with each pair of power/reference planes separated by a dielectric layer. The power laminate (20) may also include a connector or other means for receiving power from an external power source. The power laminate may be electrically coupled to the integrated circuit (5), thereby enabling it to provide power to the integrated circuit (5). The power laminate may also include a voltage regulator circuit, and a plurality of decoupling capacitors (40).



WO 02/037248 A3

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 01/48496

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H05K1/14 H05K7/02 G05F1/46 H02M3/156

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 H05K

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)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 481 436 A (WERTHER) 2 January 1996 (1996-01-02)	1,4,6,9, 17,18, 21,23, 26,34
Y	column 12, line 32 -column 14, line 24; figures 11-13	2,3,5,7, 10-13, 15,16, 19,20, 22,24, 27-30, 32,33

	-/--	

☒ 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

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.

G document member of the same patent family

Date of the actual completion of the international search

30 September 2002

Date of mailing of the international search report

08/10/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Mes, L

INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/US 01/48496

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 03, 31 March 1999 (1999-03-31) & JP 10 321979 A (HEWLETT PACKARD CO <HP>), 4 December 1998 (1998-12-04) abstract	1,6,9, 18,21, 23,26,34
Y		2,12,15, 16,19, 29,32,33
	-& US 6 175 509 B1 (KOCH) 16 January 2001 (2001-01-16) the whole document	
A	US 5 077 639 A (HALLER ET AL.) 31 December 1991 (1991-12-31)	1,4,6,9, 13,18, 21,23, 26,34
Y	column 4, line 17 -column 5, line 7; figures 4-8	3,5,20, 22
A	US 5 870 290 A (CHUN ET AL.) 9 February 1999 (1999-02-09)	1,4,6,9, 17,18, 21,23, 26,34
Y	column 3, line 44 -column 6, line 65; figures 2-7	7,13,24, 30
A	US 4 628 411 A (BALDERES ET AL.) 9 December 1986 (1986-12-09)	1,2,4-6, 9,12,18, 19, 21-23, 26,29
Y	claims; figures	10,11, 27,28
A	US 5 982 635 A (MENZIES ET AL.) 9 November 1999 (1999-11-09)	1,4,6,9, 17,18, 21,23, 26,34
	the whole document	
A	EP 0 641 046 A (ADVANCED MICRO DEVICES INC) 1 March 1995 (1995-03-01)	1,4,6, 17,18, 21,23,24
	claims; figures	

INTERNATIONAL SEARCH REPORT
 Information on patent family members

International Application No
 PCT/US 01/48496

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5481436	A	02-01-1996	US 5479319 A	26-12-1995
			US 5481435 A	02-01-1996
			US 5515241 A	07-05-1996
			US 5625944 A	06-05-1997
			US 5513076 A	30-04-1996
			US 5712768 A	27-01-1998
JP 10321979	A	04-12-1998	US 6175509 B1	16-01-2001
US 5077639	A	31-12-1991	DE 3910518 A1	04-10-1990
			DE 4002901 A1	08-08-1991
			EP 0391105 A2	10-10-1990
			JP 2298006 A	10-12-1990
US 5870290	A	09-02-1999	NONE	
US 4628411	A	09-12-1986	DE 3585924 D1	04-06-1992
			EP 0154765 A2	18-09-1985
			JP 1817736 C	27-01-1994
			JP 5019316 B	16-03-1993
			JP 60195993 A	04-10-1985
US 5982635	A	09-11-1999	NONE	
EP 0641046	A	01-03-1995	DE 69409453 D1	14-05-1998
			DE 69409453 T2	12-11-1998
			EP 0641046 A1	01-03-1995
			JP 7153537 A	16-06-1995
			US 5546297 A	13-08-1996