

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 July 2003 (24.07.2003)

PCT

(10) International Publication Number
WO 2003/061005 A3

(51) International Patent Classification⁷: **H01L 23/64**, 23/31, 23/498

(21) International Application Number:
PCT/US2002/039514

(22) International Filing Date:
10 December 2002 (10.12.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/039,131 2 January 2002 (02.01.2002) US

(71) Applicant: **INTEL CORPORATION** [US/US]; 2200 Mission College Boulevard, Santa Clara, CA 95052 (US).

(72) Inventors: **RABADAM, Eleanor**; 359 Coventry Circle, Folsom, CA 95630 (US). **FOEHRINGER, Richard**; 3300 Diablo Trail, El Dorado Hills, CA 95682 (US).

(74) Agent: **MALLIE, Michael, J.**; Blakely, Sokoloff, Taylor & Zafman LLP, 12400 Wilshire Boulevard, 7th Floor, Los Angeles, CA 90025-1026 (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, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

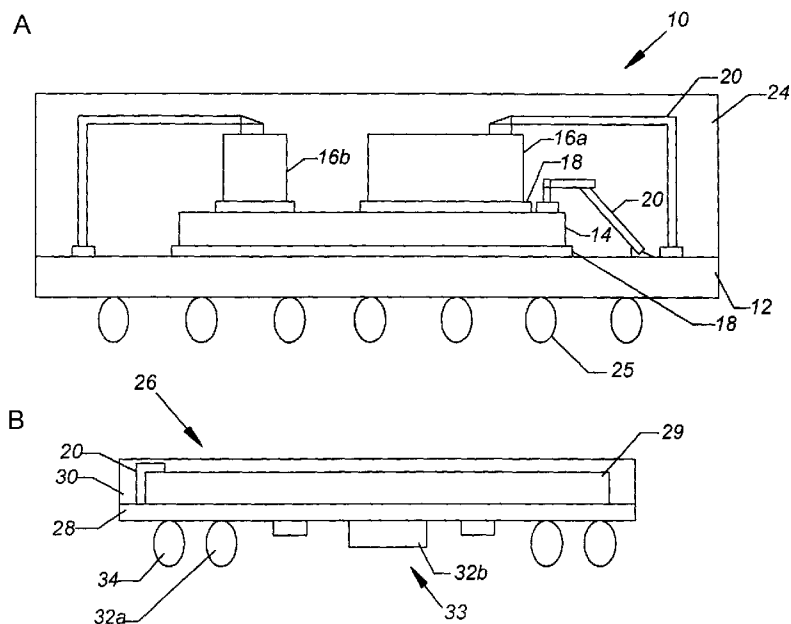
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, 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:
15 July 2004

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

(54) Title: LOWER PROFILE PACKAGE FOR AN INTEGRATED CIRCUIT WITH POWER SUPPLY IN PACKAGE



(57) Abstract: A package (10) with a Power Supply In Package (PSIP) feature may include a charge pump (16) external to the die (14) in order to take advantage of a smaller die size. The die (14) may be mounted on a substrate with an array of solder balls (34) of a Ball Grid Array. The package (10) may have substantially the same size as a package without PSIP capability. In one embodiment, the passive components (16) may be mounted on the die (14) using epoxy (18). In another embodiment, the reduced-size passive components (32) may be mounted on the substrate (28) of the ball grid array (34) in a region (33) free of solder balls.

WO 2003/061005 A3