(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

162162

(43) International Publication Date
10 January 2002 (10.01.2002)

PCT

(10) International Publication Number
WO 02/03421 A2

(51) International Patent Classification[7]: H01L

(21) International Application Number: PCT/US01/19364

(22) International Filing Date: 14 June 2001 (14.06.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/606,531 30 June 2000 (30.06.2000) US

(71) Applicant *(for all designated States except US)*: **INTEL CORPORATION** [US/US], 2200 Mission College Boulevard, Santa Clara, CA 95052 (US)

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **CHUNG, Chee-Yee** [—/US]; 5141 West Shannon Street, Chandler, AZ (US) **FIGUEROA, David, G.** [US/US], 5025 E. Hilton Avenue, Mesa, AZ 85206 (US). **LI, Yuan-liang** [—/US], 1422 West Hopi Drive, Chandler, AZ 85224 (US)

(74) Agents: **SKWIERAWSKI, Paul, J.** et al., Antonelli, Terry, Stout & Kraus, Suite 1800, 1300 North Seventeenth Street, Arlington, VA 22209 (US)

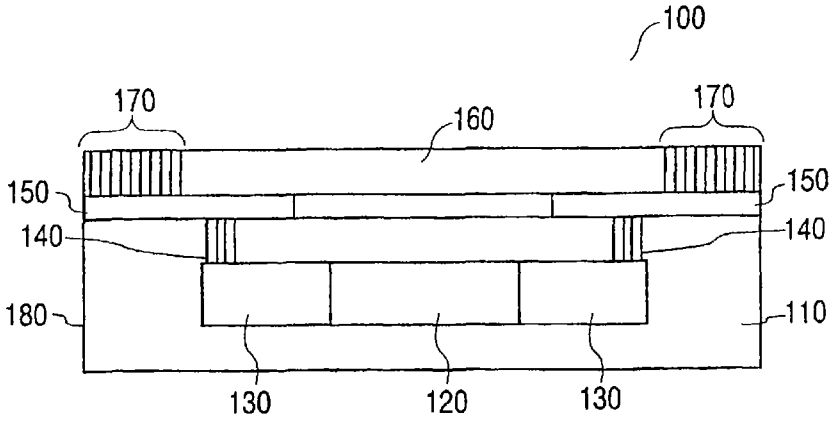
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD,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

Published:
— *without international search report and to be republished upon receipt of that report*

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

) **Title:** EMBEDDED CAPACITOR ASSEMBLY IN A PACKAGE



(57) **Abstract:** A capacitor assembly having one or more capacitors embedded in the core layer of a package having integrated circuits (ICs) mounted thereon. Each embedded capacitor has plural pairs of first and second electrodes and the package core layer has plural sets of first and second vias dispersed over the pairs of electrodes and being connected thereto A metal layer is provided on the core layer and includes a first portion having at least one metal strip and a second portion, electrically isolated from each strip. Each metal strip is positioned such that it is extended to overlie both the first electrode of a distinct pair of electrodes and the second electrode of an adjacent, succeeding pair of electrodes and effects a mutual electrical connection between them through first and second vias associated therewith, respectively. A wiring layer which may be a dielectric interlevel connection layer, provided on the metal layer, has plural sets of third vias that are disposed over the center of the capacitor such that adjacently disposed sets of third vias alternate between contacting the individual ones of the metal strips and contacting the second portion of the metal layer to provide interlayer electrical connections therethrough, respectively, to wirings or terminals in the package The individual metal strips associated with the first portion of the metal layer are to be applied with one of the power and ground reference signals of the package assembly and the second portion thereof is to be applied with the other one of the power and ground voltages. These capacitors may be employed as bypass capacitors in a package assembly for integrated circuits

WO 02/03421 A2