



(51) International Patent Classification:

H01G 2/06 (2006.01) *H05K 1/18* (2006.01)
H01G 4/232 (2006.01) *H05K 1/11* (2006.01)
H01G 4/28 (2006.01) *H01L 23/488* (2006.01)

(21) International Application Number:

PCT/IB2021/054293

(22) International Filing Date:

19 May 2021 (19.05.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

16/918,251 01 July 2020 (01.07.2020) US

(71) Applicant: **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, New York 10504 (US).

(71) Applicants (*for MG only*): **IBM (CHINA) INVESTMENT COMPANY LTD.** [CN/CN]; 25/F, Pangu Plaza, No. 27, Central North 4th Ring Road, Chaoyang District, Beijing 100101 (CN). **IBM DEUTSCHLAND GMBH** [DE/DE]; IBM-Allee 1, 71139 Ehningen (DE).

(72) Inventors: **BERGE, Layne**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US). **DOYLE, Matthew**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US). **DANGLER, John**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US). **SCHONECK, Kyle**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US). **LIANG, Thomas**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US). **WALTHER, Matthew**; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US).

(54) Title: SOLDER COLUMN GRID ARRAY CAPACITORS

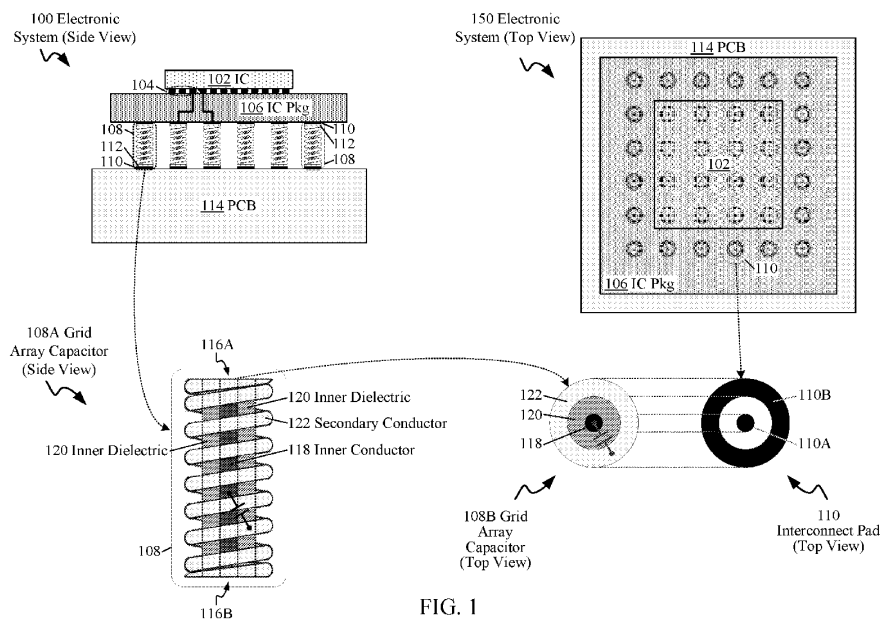


FIG. 1

(57) Abstract: A grid array capacitor (108) can be used to physically and electrically couple an integrated circuit (IC) package (106) to a printed circuit board (PCB) (114). The grid array capacitor (108) includes an inner conductor (118) and an inner dielectric (120) coaxially surrounding the inner conductor (118). A secondary conductor (122) can be located to surround, in a coaxial orientation, the inner dielectric (120). Both the inner conductor (118) and the secondary conductor (122) can be electrically connected to the integrated circuit package (106) and to the printed circuit board (114). In certain applications, the structure of the inner conductor (118), inner dielectric (120), and secondary conductor (122) can provide capacitance used to decouple electronic circuits.

[Continued on next page]

BJORGAARD, Jason; c/o IBM Corporation, 3605 Highway 52 North, Rochester, Minnesota 55901-1407 (US).

(74) **Agent: DOEHLER, Denis**; c/o IBM Deutschland GmbH, Patentwesen und Urheberrecht, IBM-Allee 1, 71139 Ehningen (DE).

(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE