

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
12 August 2004 (12.08.2004)

PCT

(10) International Publication Number
WO 2004/068700 A3

(51) International Patent Classification⁷: **H03F 3/68**,
1/32, 3/195

(21) International Application Number:
PCT/US2004/001642

(22) International Filing Date: 21 January 2004 (21.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/351,132 24 January 2003 (24.01.2003) US

(71) Applicant (for all designated States except US): **QUALCOMM INCORPORATED** [US/US]; 5775 Morehouse Drive, San Diego, CA 92121-1714 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **SUN, Bo** [CN/US]; 2278 Paseo Saucedal, Carlsbad, CA 92009 (US).

(74) Agents: **WADSWORTH, Philip, R.**, et al.; 5775 Morehouse Drive, San Diego, CA 92121-1714 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

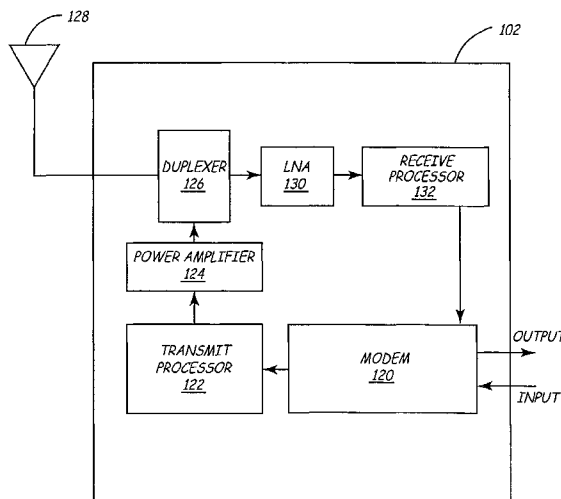
Published:

— with international search report

(88) Date of publication of the international search report:
4 November 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: HIGH LINEARITY LOW NOISE AMPLIFIER



(57) Abstract: A feedforward nonlinearity cancellation scheme is used to improve the linearity of a low noise amplifier (LNA). An LNA incorporates a main amplifier and an auxiliary amplifier couple to receive the same input. The outputs of the main amplifier and the auxiliary amplifier are also coupled. The auxiliary amplifier may be implemented as a very low power auxiliary amplifier having a very low linearity. The output of the auxiliary amplifier contains third-order intermodulation (IM3) products that are of similar amplitude, but opposite phase, to the IM3 products generated by the main amplifier. With the outputs of the main amplifier and the auxiliary amplifier coupled, their respective IM3 products are summed together and effectively cancel each other out. As a result, the output of the LNA contains substantially no IM3 products, and the linearity of the LNA is substantially improved.

WO 2004/068700 A3