

2003012044



ACTION

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

**(19) World Intellectual Property Organization
International Bureau**



(43) International Publication Date
4 April 2002 (04.04.2002)

PCT

(10) International Publication Number
WO 02/027336 A3

(51) International Patent Classification⁷: G01R 31/28

(21) International Application Number: PCT/US01/30158

(22) International Filing Date: 25 September 2001 (25.09.2001)

(25) Filing Language: English

(26) **Publication Language:** English

(30) Priority Data:
09/670,306 26 September 2000 (26.09.2000) US

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

(72) **Inventors:** **SUSUMA, Hara**; 2069 Campton Circle, Gold River, CA 95670 (US). **IHS, Hassan**; 9750 Old Placerville Road, #98, Sacramento, CA 95827 (US).

(74) Agents: MALLIE, Michael, J. et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025 (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, MS, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

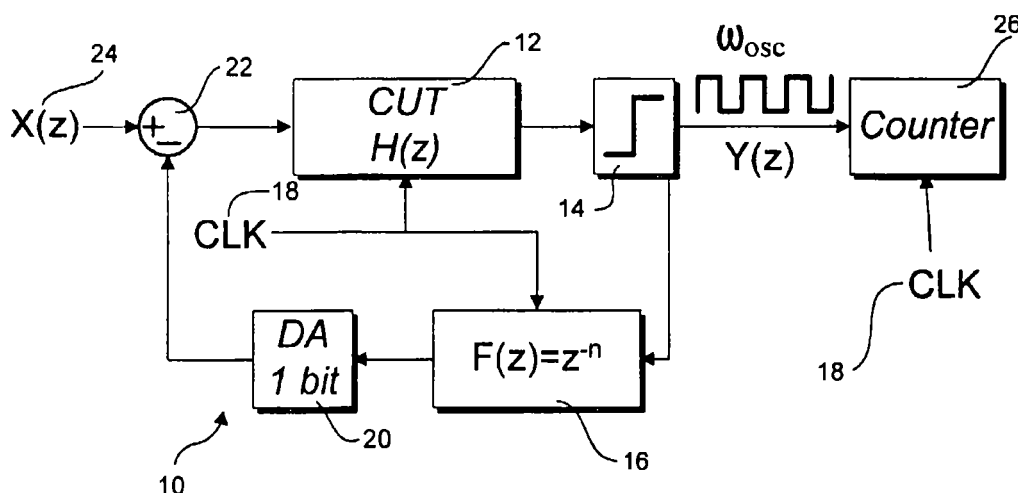
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML,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

Published:
— *with international search report*

(88) Date of publication of the international search report:
1 May 2003

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: BIST METHOD FOR TESTING CUT-OFF FREQUENCY OF LOW-PASS FILTERS



(S7) Abstract: A method and circuitry for implementing a built-in self test (BIST) for determining the frequency characteristics of filter circuits in mixed-signal integrated circuits (ICs). The method comprises inserting a Circuit Under Test (CUT) into a feedback loop that looks like a sigma delta modulation loop and adjust the feedback loop so that it oscillates at the cut-off frequency of the filter. The frequency of oscillation can then easily be measured using either on-chip counter or digital automated testing equipment. The feedback loop preferably comprises a comparator, a phase-delay component, such as a delay-line, and a one-bit DAC, wherein the comparator is connected to the output of the CUT, and the output of the one-bit DAC is connected to the input of the CUT. The phase delay of the feedback loop can be tuned through adjustment of the delay-line (e.g., an n-length shift register) until an oscillation frequency is obtained. In the case of low-pass filters circuits, the tuned frequency of oscillation corresponds to the cut-off frequency of the CUT.



162162

WO 02/027336 A3