

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
16 July 2020 (16.07.2020)



(10) International Publication Number
WO 2020/146534 A1

(51) International Patent Classification:

H03F 1/02 (2006.01) H03F 1/56 (2006.01)
H03F 1/30 (2006.01)

(21) International Application Number:

PCT/US2020/012788

(22) International Filing Date:

08 January 2020 (08.01.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/790,643 10 January 2019 (10.01.2019) US

(71) Applicant: **SKYWORKS SOLUTIONS, INC.** [US/US];
20 Sylvan Road, Woburn, Massachusetts 01801 (US).

(72) Inventors: **DATTA, Kunal**; 20 Sylvan Road, Woburn,
Massachusetts 01801 (US). **FAYED, Khaled A.**; 20 Sylvan
Road, Woburn, Massachusetts 01801 (US). **ANTHONY,
Edward James**; 20 Sylvan Road, Woburn, Massachusetts
01801 (US). **JAYARAMAN, Srivatsan**; 20 Sylvan Road,

Woburn, Massachusetts 01801 (US). **FENG, Jinghang**; 20
Sylvan Road, Woburn, Massachusetts 01801 (US).

(74) Agent: **ALTMAN, Daniel, E.**; Knobbe, Martens, Olson &
Bear, LLP, 2040 Main Street, 14th Floor, Irvine, California
92614 (US).

(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, 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,

(54) Title: APPARATUS AND METHODS FOR BIASING OF POWER AMPLIFIERS

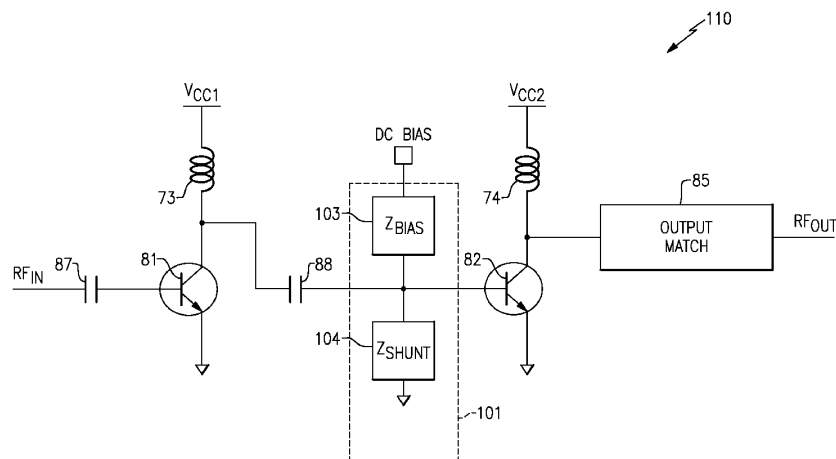


FIG.4

(57) Abstract: Apparatus and methods for biasing power amplifiers are provided herein. In certain embodiments, a power amplifier includes a bipolar transistor having a base biased by a bias network having a reactance that controls an impedance at the transistor base to achieve substantially flat phase response over large dynamic power levels. For example, the bias network can have a frequency response, such as a high-pass or band-pass response, that reduces the impact of power level on phase distortion (AM/PM).

[Continued on next page]

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).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*