



US 20240214018A1

(19) **United States**

(12) **Patent Application Publication**
Gambini

(10) **Pub. No.: US 2024/0214018 A1**

(43) **Pub. Date: Jun. 27, 2024**

(54) **RECEIVER HAVING PASSIVE MIXER WITH HIGH-ORDER FILTER**

(52) **U.S. Cl.**

CPC *H04B 1/16* (2013.01); *H03D 7/12* (2013.01); *H03H 11/04* (2013.01)

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

(57)

ABSTRACT

(72) Inventor: **Simone Gambini**, San Francisco, CA (US)

An electronic device may include a receiver that receives radio-frequency signals using an antenna. The receiver may include a passive voltage mode mixer coupled to a passive second-or-higher order switched-capacitor filter with complex poles. Clocking circuitry may provide a control signal to the filter to cycle the filter through a series of states, may provide first and second local oscillator (LO) signals to the mixer, and may synchronize timing of the control signal with the first and second LO signals. The first and second LO signals may have the same period but may be shifted in time by half the period. The period may be equal to the duration with which the filter is placed in each of the states. The clocking circuitry may pulse the first and second LO signals once while the filter is placed in each of the states.

(21) Appl. No.: **18/145,423**

(22) Filed: **Dec. 22, 2022**

Publication Classification

(51) **Int. Cl.**

H04B 1/16 (2006.01)
H03D 7/12 (2006.01)
H03H 11/04 (2006.01)

