US 20240235565A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0235565 A1**

CHAO et al. (43) **Pub. Date: Jul. 11, 2024**

(54) **CHARGE-INJECTION SAR ADC FOR CORRECTING FULL SCALE PVT VARIATION**

(71) Applicants: **YUAN-JU CHAO**, CUPERTINO, CA (US); **JOHN H YU**, SAN JOSE, CA (US); **KRISHNAMURTHY SUBRAMANIAN**, SARATOGA, CA (US)

(72) Inventors: **YUAN-JU CHAO**, CUPERTINO, CA (US); **JOHN H YU**, SAN JOSE, CA (US); **KRISHNAMURTHY SUBRAMANIAN**, SARATOGA, CA (US)

(21) Appl. No.: **18/407,613**

(22) Filed: **Jan. 9, 2024**

Related U.S. Application Data

(60) Provisional application No. 63/438,040, filed on Jan. 10, 2023.

Publication Classification

(51) **Int. Cl.**
H03M 1/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H03M 1/0604*** (2013.01)

(57) **ABSTRACT**

A charge-injection SAR ADC device has a modified charge-injection cell (CIC), and a complementary to absolute temperature (CTAT) circuit for generating a bias voltage. The CIC and CTAT circuits cooperate to correct for process, voltage, and temperature (PVT) variation that affect SAR ADC input full scale. The CIC has been modified to have transistors that are in a cascoded relationship with transistors operating to maintain a reservoir of charge. The CTAT circuit is designed to substantially replicate the CIC, and it tracks the CIC operation to correct variations in transistor threshold voltage due to variations in PVT.