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(43) **Pub. Date:** **Jul. 20, 2023**(54) **VOLTAGE REGULATOR WITH DYNAMIC VOLTAGE AND FREQUENCY TRACKING**(52) **U.S. Cl.**
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Chia-Hua CHOU, Hsinchu City (TW)(21) Appl. No.: **18/057,311**(22) Filed: **Nov. 21, 2022****Related U.S. Application Data**

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H02M 3/335 (2006.01)(57) **ABSTRACT**

A voltage regulator with dynamic voltage and frequency tracking is shown. The voltage regulator has power switches converting an input voltage into an output voltage, a control loop, a voltage comparator, and a target voltage generator. The control loop is coupled to the power switches to control the power switches to perform voltage regulation. The voltage comparator compares the output voltage to the target voltage to generate a first control signal to control the control loop. The target voltage generator generates the target voltage for the voltage comparator based on the frequency difference between the target frequency and the critical-path-related frequency, wherein the critical-path-related frequency depends on the output voltage. The power efficiency and response time are improved.

