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[54] **MICROCONTROLLER WITH ANALOG FRONT-END FOR PROVIDING INTELLIGENT BATTERY MANAGEMENT**

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[52] **U.S. Cl.** **395/750.01**; 341/141

[58] **Field of Search** 320/48; 341/141, 341/169, 164; 395/750.01

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[57] **ABSTRACT**

A microcontroller for use in battery charging and monitoring applications is disclosed. The microcontroller includes a microprocessor and various front-end analog circuitry including a slope A/D converter and a multiplexer for allowing a plurality of analog input signals to be converted to corresponding digital counts indicative of signal level. The slope A/D converter includes a digital-to-analog converter (DAC) for providing a programmable charging current to generate a voltage across a capacitor, a precision comparator having inputs for receiving a selected analog input and the capacitor voltage, a counter and a capture register. After a reset is performed, the capacitor is charged while the counter begins counting such that when the capacitor voltage exceeds the selected analog input voltage, the comparator switches logic states thereby causing the obtained count of the counter to be stored in the register. This stored count represents the time that it took for the capacitor to charge up and exceed the selected analog input voltage and corresponds to voltage measurement of the selected analog input.

15 Claims, 16 Drawing Sheets

