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[54] **MICROCONTROLLER WITH ON-CHIP LINEAR TEMPERATURE SENSOR**

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[58] **Field of Search** 364/557, 550, 364/551.01, 481; 377/25; 330/289; 341/119, 110, 144; 374/100, 170, 102, 169, 103, 152; 340/870.17, 588, 589, 636; 320/31, 39, 35, 43; 324/427, 428, 431–434, 441

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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 microcontroller further includes an on-chip temperature sensor, used in conjunction with the A/D converter, to monitor the temperature of the microcontroller. The temperature sensor generates and uses a differential voltage that is obtained across the base-emitter functions of two compatible bipolar transistors having dissimilar emitter areas. This differential voltage is proportional to temperature and may be sampled by the A/D converter to obtain a digital count indicative of the temperature of the microcontroller.

10 Claims, 16 Drawing Sheets

