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[54] **CROSS COUPLED QUAD COMPARATOR FOR CURRENT SENSING INDEPENDENT OF TEMPERATURE**

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[52] **U.S. Cl.** **327/80**; 327/427

[58] **Field of Search** 327/51–57, 77, 327/80, 81, 142, 215–219, 427

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[57] **ABSTRACT**

A circuit and method for sensing and limiting current. A resistor (R1) is used to generate a voltage (V1) proportional to the current flowing in an output transistor (M1). A comparator is formed in a cross coupled quad configuration from bipolar transistors (Q11, Q12, Q13 and Q14) and is coupled to the resistor (R1). When the current in the resistor (R1) generates a voltage in excess of a threshold voltage for the cross coupled quad circuit, the cross coupled quad generates an output indicating the threshold has been reached. In a current limiting configuration, the output of the cross coupled quad is used to reset a flip-flop (FF1) that drives the gate terminal of the output transistor (M1), thus shutting down the output transistor before it is damaged due to excess current. The threshold voltage that triggers the cross coupled quad is proportional-to-absolute-temperature. This property allows the comparator to be combined with an aluminum resistor (R1) to form a current sensing circuit that has a threshold current that is independent of temperature, since the temperature coefficient of the resistor will cancel the temperature coefficient of the comparator. The threshold voltage of the comparator may be adjusted by adjusting the emitter areas of the bipolar transistors (Q11, Q12, Q13 and Q14) which make up the cross coupled quad circuit. The circuitry of the invention may be applied to a high side driver or a low side driver output circuit. Other embodiments are also described.

20 Claims, 2 Drawing Sheets