

ABSTRACT

Interface-Trap Charge-Pump Temperature Sensor. (May 2001)

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This thesis deals with a new method to measure die surface temperature of VLSI chips. On-chip temperature sensors are widely used in newer VLSI circuits as a monitoring technique for fault detection and prevention. The temperature sensor is based on a feedback loop that is able to measure extremely small currents. The core of this loop is the charge-pump. The loop can be used in other applications including analog to digital converters, ultra low frequency filters and many others as well as temperature sensing. The temperature sensor uses this feedback loop to measure leakage current that is a strong function of temperature. The output of this sensor is a pulse waveform and its frequency is proportional to temperature. The main advantage of this temperature sensor in comparison to the other methods is its compatibility with CMOS technology. While other methods rely on parasitic BJT transistors or diodes, the interface-trap charge-pump temperature sensor uses standard CMOS technology devices.