A Low-Power NPN-based Bandgap Voltage Reference in An Ultra-wide Temperature Range

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Abstract

A low-power NPN-based bandgap voltage reference (BGR) over an ultra-wide temperature range is presented. The conventional NPN-based BGRs cannot maintain a low-temperature coefficient (TC) over an ultra-wide temperature range due to the inherent substrate leakage current of the NPN bipolar junction transistors (BJT) in the high-temperature range. This work introduces a new NPN-based BGR unaffected by substrate leakage current and receives low TC over the range of -40 to 150. The proposed circuit was fabricated in a 180 nm CMOS process. It consumes 2uA from a 4V power supply, and its average TC is 14.89ppm/. Also, the average line sensitivity is 0.039%/V.

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