Original Articles

Measurement and analysis of BJT current mirror frequency response at low DC bias currents

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Abstract

The AC current transfer ratios for BJT current mirrors operating with nanoampere DC bias currents have been measured and analysed. The new measurement technique uses current-feedback topology instrumentation amplifiers to sense indirectly the input and output currents of a current mirror under test. Sample results are reported for the popular two-transistor and Wilson current mirrors. The measured frequency response data show that bipolar integrated circuit current mirrors, biased at nanoampere DC currents, have current transfer ratios in the range 0.7 to 1 with sufficient bandwidth for use in micropower circuit design. There is close agreement between measured and theoretical data. However, the results of SPICE simulation deviate at very low currents, confirming previous reports of inadequacies in the BJT model under these conditions.