A CMOS Bandgap Current and Voltage References

Personnel
M. C. Guyton (H.-S. Lee)

Sponsorship
Center for Integrated Circuits and Systems

Most analog circuits require reference voltages and currents that do not vary with power supply voltages and temperature. Bandgap voltage references with an output voltage around 1.2 volts have been popular for this purpose. However, producing non-integer multiples of bandgap voltage requires an operational amplifier increasing the complexity and power consumption. Bandgap current references also require an operational amplfier.

The focus of this research is to develop simple and low power bandgap current and voltage references. We have developed a novel bandgap core circuit that produces a bandgap referenced output current directly without an operational amplifier. This simple circuit can even be operated as a 2-terminal bandgap current source. The same core circuit can also be used to generate arbitrary non-integer multiples of bandgap voltage.

A prototype 2-terminal band-gap current source has been designed and fabricated employing only 4 MOS transistors and 2 parasitic PNP transistors in a standard 0.35μ CMOS technology. We are presently evaluating the first silicon.