

A technique to analyze different types of sensors and references is presented. Many well-known circuits, as the bandgap reference, Widlar current reference and threshold-voltage-based temperature sensors can be analyzed and modified thanks to the insight obtained with the method proposed. This systematic approach to the study of these circuits has the advantage of naturally leading to self-biased circuits, which are more insensitive to perturbations. Also, an Analog-to-Digital conversion can be embedded into the sensor by means of a feedback ADC, such as Successive Approximation ADC, tracking ADC, or Sigma-Delta ADC.

As an example of application, a variation of the Inverted Widlar temperature sensor is designed. By means of this technique, the sensor could be implemented without the need of devices with different threshold voltages. Also, the output is readily available as a digital code that is proportional to the temperature.