

Temperature compensation for semiconductors

Minimize temperature and tolerance effects in MOS circuits

Invention

Semiconductor components such as diodes or transistors have various parametric sensitivities: If, for example, the operating temperatures of components fluctuate, they change their parameters. Temperature changes thus have a direct effect on the current-voltage behavior of semiconductors - which can have a negative impact on analog circuits in particular, such as sensor readout circuits, and then lead to erroneous readings.

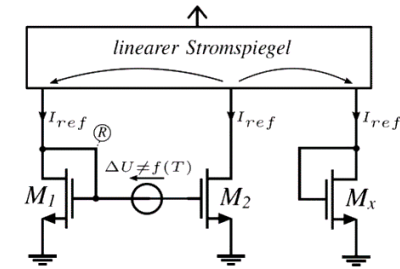


Fig. 1

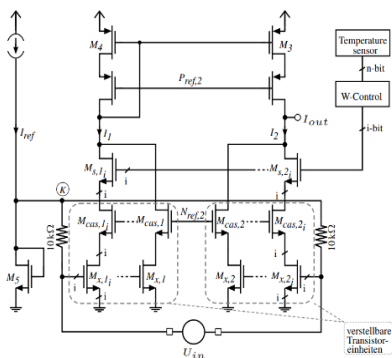


Fig. 2

used which are configured centrally via a common digital control word as a function of the current operating temperature.

Commercial Opportunities

The new technology is a universal method that can be used in volume production for all known analog MOS circuit arrangements. Over the entire operating temperature range from -40°C to +140°C, which is typically of industrial interest, all key parameters such as current consumption, dynamic ranges, gains, equivalent 1/f input noise and also frequency responses can optionally be kept almost perfectly constant. In extreme cases, the method can also be robustly applied in the lower cryogenic temperature range (down to close to 0°K), but also well above +140°C (high temperature range).

Current Status

Initial test structures have been produced, tested, and measured in the laboratory, thus demonstrating functional suitability. A registration at the German Patent and Trademark Office has been made, further international follow-up registrations are possible in the priority year. We offer interested companies the possibility of licensing as well as further development of the technology in cooperation with the inventors at the Ruhr University Bochum.

An invention of the Ruhr University Bochum.

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Competitive Advantages

- Suitable for CMOS and SOI transistor circuits
- Simple setting of all operating points
- Operating range from -40°C to +140°C
- High accuracy and robustness

Technology Readiness Level

123456789
Experimental proof of concept

Industries

- Electro-technology
- Semiconductor

Ref. No.
6813

Contact

Martin van Ackeren
E-Mail: ma@provendis.info
Phone: +49(0)208-94105-34



PROvendis GmbH

Schlossstraße 11-15
45468 Muelheim an der Ruhr
Germany
www.provendis.info