Category: Current Source

CIRCUIT IDEAS FOR DESIGNERS

Schematic no. cs_11010.0

Nanoamp Cascode EPAD Current Sink

Description

This is a basic zero gate bias N-channel Cascode EPAD current source. The gate and the source of each MOSFET, M1 and M2, are connected to their respective sources. Hence, no separate gate bias voltages are required. The MOSFETs essentially operate at or below their threshold voltage, $V_{GS(th)}$, which are in the subthreshold region. At $V_{GS(th)}$ set to 0.0V, the drain-source current, $I_{DS} = I_{OUT}$, for the ALD110800 (or ALD110900), is ~1000nA at V_{DS} = 0.1V. At $V_{GS(th)}$ set to 0.0V, the drain-source current, $I_{DS} = I_{OUT}$, for the ALD110802 (or ALD110902, ALD212902, ALD210802), is ~20nA at V_{DS} = 0.1V. At $V_{GS(th)}$ set to 0.0V, the drain-source current, $I_{DS} = I_{OUT}$, for the ALD110804 (or ALD110904, ALD212904, ALD210804), is ~0.2nA at V_{DS} = 0.1V. ALD devices with higher threshold voltages decrease the current, I_{DS}, as well as the power dissipated. This nA cascode current source produces very high equivalent output resistance. The transistor M1 uses a depletion mode MOSFET current source such as the ALD114804 that has a $V_{GS(th)}$ of -0.4V. Using a device with a negative $V_{GS(th)}$ ensures that the circuit is always on. Cascoding the transistors isolates the input from the output.

For full schematic diagram and notes, please register and login at aldinc.com