Category: Level Translators   **CIRCUIT IDEAS FOR DESIGNERS**   Schematic no. LT_23003.0

Very Low Voltage Level to Logic Level Voltage Translator

Description

This is an ultra low-voltage inverter circuit using zero threshold (ALD110800) or nanopower (ALD110802 or ALD110804) EPAD MOSFETs. This circuit can also function as a voltage level translator that translates very low input voltage swing levels to higher voltage swing levels.

The basic inverter uses one of the EPAD MOSFETs with V+ ranging from 50 mV to 800 mV (higher voltages such as +5V can also be used). This inverter can operate in one of two modes. In the first mode of operation, the inverter can operate in the sub threshold operating region of the EPAD MOSFET device, resulting in extremely low operating voltages and currents, when the pull-up resistor R is at a high resistor value. In the second mode of operation, the inverter operates at or above the threshold voltage, resulting in faster switching and wide output voltage swing levels at a lower R value.

As an example, with a supply voltage V+ = 200mV, the average power consumption of an ALD110802 based inverter is about 25 nW (nanoWatt), assuming a 50% duty cycle 1KHz signal, giving V_{OL}= 9 mV and V_{OH} = 183 mV. Another configuration example of this inverter circuit uses an ALD110904 device, with $V_{GS(TH)}$ of 0.4V and load resistor of 44MEG Ohm, resulting in an average current drain of 2.3 nA and power dissipation of 0.45 nW, at a supply voltage V+ = 200mV.

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