

Schematic no. cd_23011.0

Zero-Power Voltage Detector

Description

This is a zero-power voltage detector suitable for extremely low duty cycle voltage detection applications. As an illustration, a sensor with outputs ranging from 0.1V to 0.5V is used. 0.1V may represent a "0", or OFF-state, while 0.5V may represent a "1", or ON-state. A MOSFET device with a precision threshold voltage of 0.4V +/-0.02V can be used. This MOSFET has a threshold voltage sufficiently accurate that the threshold voltage can be used as a rough voltage reference for the purposes of this circuit. The MOSFET device also acts as a voltage comparator as it has an inverting voltage gain = gm x R. R is a resistor value selected to be 20M Ω . At sensor output of 0.1V, the MOSFET is operating in its sub-threshold mode, and its drain current can be estimated from its performance characteristics at about 2nA. At V+ = +1.5V, the nominal output voltage Vout = 1.5 - 2nA x 20M Ω = 1.46V. At sensor output of 0.5V, the MOSFET drain current is estimated at 2µA and the output voltage is now = 1.5 - 2µA x 20M Ω = ~0.0V. If this circuit is used as an alarm circuit, where the normal OFF-state is 0.1V , then the MOSFET and the entire circuit is normally draining about 2nA, with the power drain = 2nA x 1.5V = ~3nW = ~ zero power.

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

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