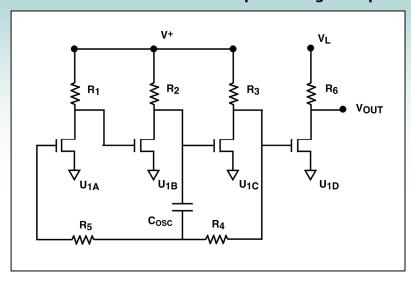


Category: Oscillators

CIRCUIT IDEAS FOR DESIGNERS

Schematic no. osc_42005.0

0.14V RC Oscillator Circuit with Separate Logic Output Buffer



Description

This circuit is a low voltage EPAD MOSFET RC oscillator that operates at V+=0.14V. In this circuit U1A, U1B and U1C form the basic three-stage oscillator with feedback resistor and capacitor network R4, Cosc and R5. The output is tapped and buffered with U1D as an output buffer stage. Power to the output stage is supplied by VL. V1 can be either at V+ or at a different value, depending on the desired output high level. If V1 is at a different voltage level, then the output buffer also acts as a level shifter. To minimize power consumption, R6 value is maximized for proper output voltage-swing levels.

Using a low threshold enhancement mode EPAD MOSFET, the ALD110804 (quad with VGS(TH)=0.40V), this oscillator operates on 0.14V supply voltage and at 1nW of power, at a frequency of 40 Hz. Capacitor Cosc and Resistor R5 determine oscillating frequency of the RC oscillator, is generally given by fosc = 1 / (2 Pi * R5 * Cosc). However, the EPAD MOSFET is operating entirely in the subthreshold operating region of the MOSFET device. The charging of Cosc is limited by R3+R4 and the discharging of Cosc is limited by the current drive of U1C. These factors tend to decrease the actual oscillating frequency significantly. The remaining resistors R1 through R6 help determine the power dissipation as well as the oscillating frequency, and can be optimized for minimum power consumption of the circuit for a given desired frequency.

Recommended Components

EPAD MOSFET: ALD110804; Cosc: 0.1 nF; R5: 4 MOhm; R1,R2: 32MOhm; R3: 40MOhm; R6: 8Mohm; R4: 400MOhm

Other Related Circuit Ideas

Schematic no. osc_42008.0 Nanopower LC (Colpitts) Oscillator Circuit

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