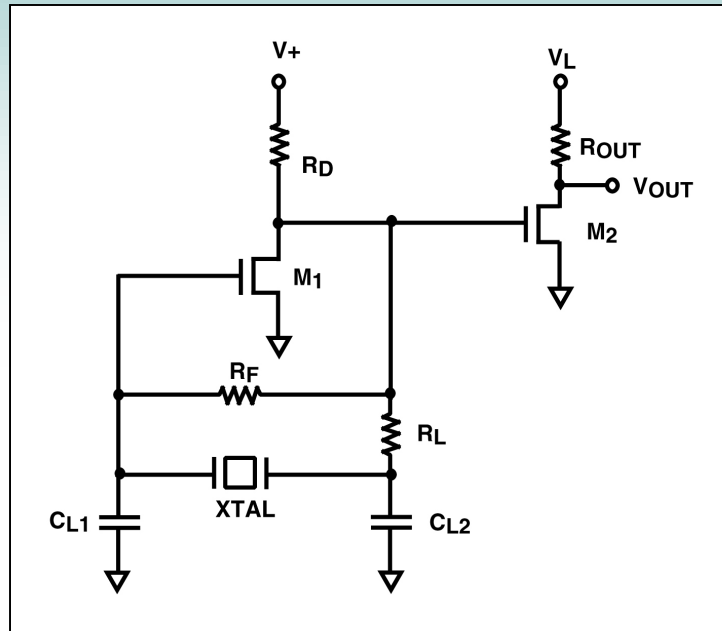




Ultra Low Voltage Micropower Crystal Oscillator Circuit



Description

This is an ultra low-voltage crystal oscillator circuit using EPAD MOSFETs with passive resistor load and output buffer. This circuit is similar to a crystal oscillator circuit used to power 5V circuits. However, at low operating voltages, the values of the resistors and the impedance of the inverter MOSFET are selected to optimize oscillation stability and at the same time minimize power consumption. Using appropriate component values, a crystal oscillator circuit can be designed to operate in a range of supply voltages from $V+ = 5V$ to $V+ = 0.5V$, with crystal frequencies ranging from 1 MHz to 16 MHz. The contrast in the corresponding power consumption is dramatic: At 5V the power consumed by a crystal oscillator circuit is 2.5 mW whereas at 0.5V, the same circuit consumes a mere 25.6 μW while oscillating at the same selected crystal frequency, resulting in an almost hundred-fold decrease in power consumption. At higher crystal frequencies in excess of 4 MHz, a dual EPAD MOSFET can be connected in parallel to provide more low voltage drive current necessary.

Recommended Components

EPAD MOSFET: **ALD110900** (either single or dual MOSFET connected in parallel)
 $CL1 = 10pF$; $CL2 = 22pF$; $R_F = 5.6M\Omega$; $R_L = 6\Omega$; $R_D = 10K\Omega$; $R_{OUT} = 2.4K\Omega$

Other Related Circuit Ideas

[Schematic no. fet_11121.0](#) Ultra Low Voltage Crystal Oscillator Circuit using Active Loads