Category: FET **CIRCUIT IDEAS FOR DESIGNERS** Schematic no. fet_11135.0

Current Source/Current Sink/Current Limiter

Description

This circuit, when $V_{AB} > 2|V_{th}|$, will pass a fixed current independent of V_{AB}. When node A is connected to the positive supply the circuit will act as a current source with node B as the output. When node B is connected to ground the circuit will act as a current sink with node A as the input. The current is set by the resistor R. If the current has a tendency to rise, the drop across R increases which biases the FET to a lower current, which counteracts the rise.

For currents much lower than I_D ($V_{GS}=0$), the resistor value is $R=|V_{th}|/I_{LIMIT}$. For other currents a graphical method is used. First, select the operating point on the graph of drain current vs. drain source voltage. Identify the value of V_{GS} by interpolating the V_{GS} curves. Then calculate the resistor value from $R=(|V_{th}|-|V_{GS}|)/I_{LIMIT}$. Alternative to a graphical solution, decide on a current limit, I_{LIMIT}. Select the resistor using the equation $R = [(I_{LIMIT}/K)0.5 - |V_{th}|]/I_{LIMIT}$, where $K = 0.5*(kn')*(W/L)$.

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