Current Source/Current Sink/Current Limiter

**Description**

This circuit, when \( V_{AB} > V_{GS(th)} \), 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 \( R = \left[ (I_{LIMIT}/K)0.5 - |V_{th}| \right] / I_{LIMIT} \), where \( K = 0.5*(k'n'*(W/L)) \).

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