Description

When M1, M2, M3 and M4 are matched devices, the current across all the transistors have exactly the same gate bias voltage and remain constant. The drain and the gate of the M1 transistor are diode-connected and the current is set with $V_{SET} = I_{SET} \times R_{SET}$. The gate of M1 is connected to the gate of transistors M2, M3, and M4, which produces currents that mirror $I_{SET}$. With equal resistance loads $R_1$, $R_2$ and $R_3$, the voltages $V_1$, $V_2$ and $V_3$ mirror $V_{SET}$. This circuit has a range of current values from 100µA to 0.1µA. A 100µA current is achieved using $R_{SET} = 1.5K\Omega$ and a 0.1µA current is achieved using $R_{SET} = 2M\Omega$. For current multiplier applications, connecting $V_1$ and $V_2$ together produces $2 \times I_{SET}$ current, and connecting $V_1$, $V_2$ and $V_3$ together produces $3 \times I_{SET}$ current. Alternatively, $V_1$, $V_2$ and $V_3$ are three separate independent current sources, each at $I_{SET}$.

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