CIRCUIT IDEAS FOR DESIGNERS

Low Power Normally-ON Switch

Description

This low power Normally-ON switch is controlled by the voltage applied at V\text{IN}. There are two transistors used in this circuit, one zero threshold voltage N-channel precision MOSFET, M1, and one enhancement mode low threshold N-channel precision MOSFET, M2. The input, V\text{IN}, is connected to the gate of M1 and biased by R3 connected to V-\text{.} If V- is grounded, V\text{IN} is grounded and M1 is slightly turned on, causing a drain to source current, ID\text{s1}, across M1. This current flows through R1 causing the drain voltage, V\text{DS1}, of M1 to be pulled to ground. At this point M2 is turned off (V\text{GS2}=V\text{DS1}) with no ID\text{s2} current flow, and giving an output voltage, V\text{OUT} close to the supply voltage, V+. If V- is connected to a negative supply voltage, M1 is now turned off, and there is very little ID\text{s1} current, resulting in a small voltage drop across R1 and bringing V\text{DS1} up close to V+. This large V\text{DS1} in turn causes M2 to turn on, causing an increase in ID\text{s2} and resulting in V\text{OUT} = V+ - (ID\text{s2} \times R2) \approx 0 \text{ volts.} This circuit is operational with V+ and V- ranging from +5V to -5V as well as +0.5V to -0.5V. An external V\text{IN} can override the voltage bias set by R3 and V- to turn on and turn off this circuit externally.

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