Re: Help with N−channel JFETs and MOSFETs ???

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jalbers@bsu.edu wrote:
>
> *I have been looking at some books on JFETs and MOSFETs and have some*
> *basic questions.*
>
> *One of my problems is with the N channel JFET and MOSFET. I don't know*
> *how to get the negative voltage levels at the gate to get the JFET and*
> *MOSFET to turn off. I think that with a P channel JFET or MOSFET you*
> *would simply set up a voltage divider to get the positive voltage*
> *levels desired.*
>
> *I am having trouble finding an example of a simple circuit with DC*
> *power supply, light bulb, N channel JFET or MOSFET, and actual method*
> *of controlling the voltage levels at the gate to adjust the brightness*
> *of the bulb.*
>
> *My main goal is to begin to understand the JFET and MOSFET, not to*
> *build a light bulb dimmer. I know that there are more efficient ways*
> *of controlling the brightness such as pulse width modulation. I think*
> *that seeing a circuit like the one discribed above would help fill some*
> *voids in my understanding of basic electronics.*
> *Any help would be greatly appreciated. Thanks*

The main difference between jfets and mosfets (aside from the fact that a diode junction isolates the gate of a jfet and silicon dioxide isolates the gate of a mosfet) is that most mosfets are enhancement types and jfets are all depletion types. Enhancement means that the fet is normally (gate tied to source voltage) off, and the gate voltage has to be positive with respect to the source (for N−channel devices) to make the channel conductive. DEpletion mode devices are on when the gate voltage is at source voltage, and turn on less as the gate voltage gets more negative than the source (for N−channel devices).

When working with a single supply, it can be difficult to use jfets in simple circuits as common source switches, because you have no voltage available that is more negative than the rail you tie the source to. They work well as amplifiers, though, if you add a resistor between

the source and negative rail, so that the channel current drops some voltage across that resistor, raising the source voltage a bit positive. Then the gate can be biased to the negative rail with a high value resistor or other path (e.g. transformer winding connected to the negative rail).

Just remember that the gate voltage must always be measured with respect to the source voltage, regardless of how the fet is connected to other things. There are smaller effects based on gate to drain voltage, but the dominant control effect is gate to source voltage.

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John Popelish