The circuit of Figure 1 is simply an on/off switch that connects $V_{\text{SUPPLY}}$ to a load. $V_{\text{SUPPLY}}$ can be positive, negative, or AC, with magnitude limited only by the MOSFETs' maximum $V_{\text{DS}}$ rating. For the device shown, that limit is 50V.

The transformer's primary winding and driver IC operate on 5V, generating an isolated secondary waveform that is rectified by D1 and D2 to produce a 10V $V_{\text{GS}}$ for the n-channel MOSFETs. $V_{\text{GS}}$ is isolated, constant, and unaffected by changes in $V_{\text{DS}}$ with respect to ground. Because the combination of a single MOSFET and negative $V_{\text{GS}}$ would allow current flow in the off state (due to forward bias on its internal parasitic diode), two MOSFETs are connected source-to-source. Their internal diodes are then opposed, blocking unwanted current flow of either polarity in the off state.

Shutting down the IC turns off the switch by removing $V_{\text{GS}}$ from the MOSFETs ($SD = 5V$ turns the switch off; $SD = 0V$ turns it on). The speed of this turn-off depends on the value of $R_1$; lower values reduce turn-off delay at the expense of higher supply current. (For $R_1 = 1\, \text{k}\Omega$, the supply current is 24mA.) If speed is not an issue, reduce the supply current to 5mA by substituting a larger $R_1$. Figure 2 shows this circuit operating with a 40V, 1.2A load.
Other switching techniques have drawbacks. Relays, for instance, have switch bounce and high power consumption (about 0.5W). The maximum $V_{GS}$ rating for most power MOSFETs (approximately 20V for standard devices, 15V for logic-level devices) makes it difficult to withstand voltages greater than 15V. It can be accomplished by level-shifting the gate voltage, but that approach wastes power. In addition, the larger gate resistor required for higher voltages slows the switching speed.

A similar idea appeared in the July 17, 1997 issue of *EDN*.

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**Related Parts**

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APPLICATION NOTE 1096, AN1096, AN 1096, APP1096, Appnote1096, Appnote 1096
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