

Keywords: JFET, linear regulator, voltage regulator

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## APPLICATION NOTE 482

## JFET Increases Voltage Rating for Linear Regulator

*Abstract: Design note shows how adding a JFET in cascode with a linear regulator extends the allowable input voltage to 25V or 40V, depending on the JFET used. The MAX666 voltage regulator is featured in the design.*

A similar version of this article appeared in the July 12, 1990 issue of *Electronic Design*.

By adding a JFET in cascode with a linear regulator (Figure 1), you can extend the regulator's input-voltage range. The regulator shown suits battery-powered applications, because its CMOS circuitry draws only 12 $\mu$ A maximum, regardless of the output-current level. The chip's  $V_{IN}$  limit of 16.5V excludes some applications, however.

Connecting the external JFET extends the circuit's input-voltage limit to the JFET's gate-source breakdown voltage. A J106 device, for instance, extends this limit to 25V. The J106 has a 6 $\Omega$  on-resistance, and IC1 has a minimum  $V_{IN}/V_{OUT}$  differential of 0.6V to 0.8V; thus, for low load currents, the combination can deliver a 5V output with chip inputs as low as 5.6V. The circuit can deliver 40mA at 5V with a 6.5V  $V_{IN}$ .

Replacing the J106 with a 2N4391 JFET increases the allowable input voltage to 40V. The 2N4391 has a 30 $\Omega$  on-resistance, so it delivers 40mA with a 2 $V_{IN}/V_{OUT}$  differential or 10mA with a 1V differential.

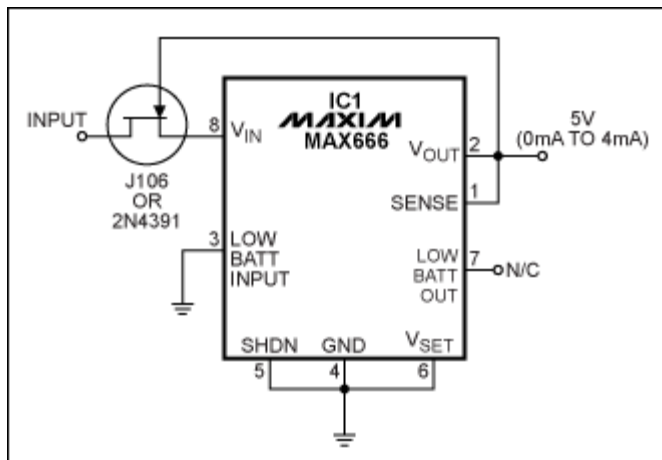


Figure 1. Adding a JFET in cascode with a linear-regulator IC extends the allowable input voltage to 25V or 40V, depending on the JFET device used.

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