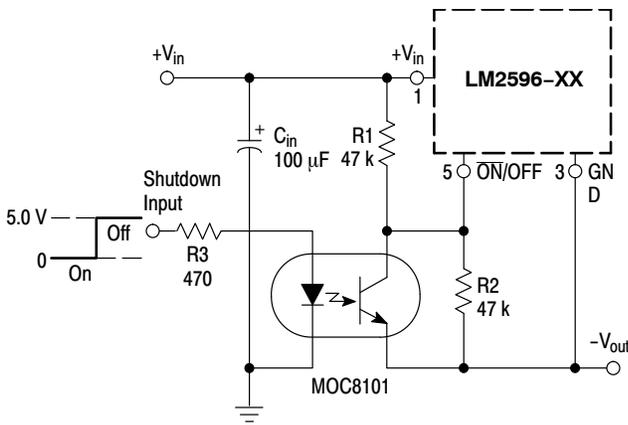


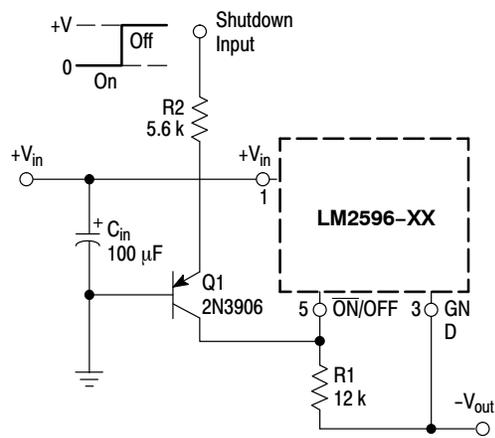
LM2596



NOTE: This picture does not show the complete circuit.

Figure 24. Inverting Buck-Boost Regulator Shutdown Circuit Using an Optocoupler

With the inverting configuration, the use of the $\overline{\text{ON/OFF}}$ pin requires some level shifting techniques. This is caused by the fact, that the ground pin of the converter IC is no longer at ground. Now, the $\overline{\text{ON/OFF}}$ pin threshold voltage (1.3 V approximately) has to be related to the negative output voltage level. There are many different possible shutdown methods, two of them are shown in Figures 24 and 25.



NOTE: This picture does not show the complete circuit.

Figure 25. Inverting Buck-Boost Regulator Shutdown Circuit Using a PNP Transistor

Negative Boost Regulator

This example is a variation of the buck-boost topology and it is called negative boost regulator. This regulator experiences relatively high switch current, especially at low input voltages. The internal switch current limiting results in lower output load current capability.

The circuit in Figure 26 shows the negative boost configuration. The input voltage in this application ranges from -5.0 V to -12 V and provides a regulated -12 V output. If the input voltage is greater than -12 V , the output will rise above -12 V accordingly, but will not damage the regulator.

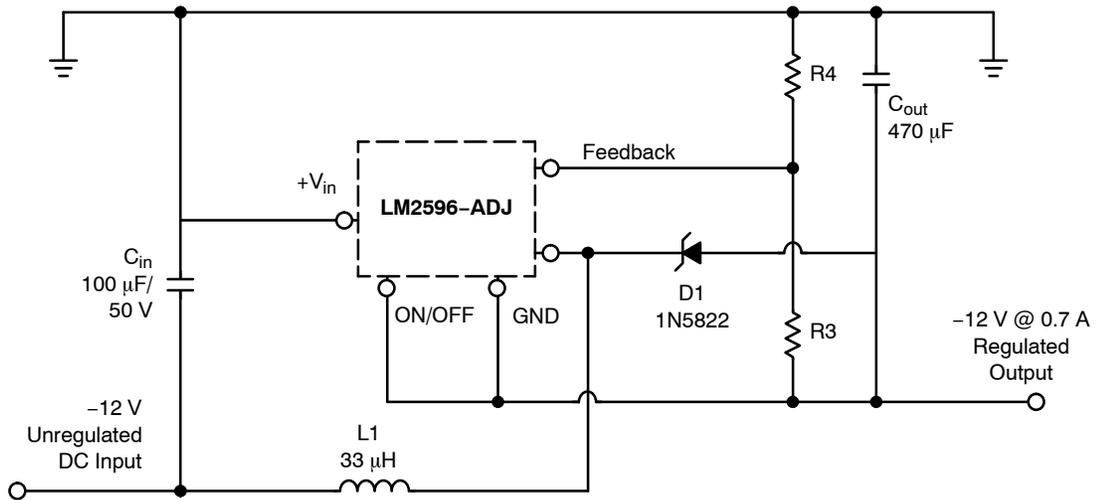


Figure 26. Negative Boost Regulator

Design Recommendations:

The same design rules as for the previous inverting buck-boost converter can be applied. The output capacitor C_{out} must be chosen larger than would be required for a what standard buck converter. Low input voltages or high output currents require a large value output capacitor (in the range of thousands of μF). The recommended range of inductor

values for the negative boost regulator is the same as for inverting converter design.

Another important point is that these negative boost converters cannot provide current limiting load protection in the event of a short in the output so some other means, such as a fuse, may be necessary to provide the load protection.