

Anston Lobo

An engineer, the multi-disciplinarian, is a scientist by work and an artist at play. Few can command the cascade to do their bidding and fewer still develop the mastery to do so effectively. The engineer's toolbox is an ever expanding one, and today we will learn a new use for an old friend – the buck converter.

You see, a buck converter, simple and trusting, can be tailored to perform more than it might appear. The power of the inverting is nothing to scoff at, mildly put, Analog has always demanded that its hungry inputs be fed by a negative and a positive. Yet, we burrowing engineers overlook the simplicity a buck can bring to make this negative affair a delight.

To take its **Inductor Output** and introduce it to **System Ground** is all an inverting application begs of ye. To present it more clearly, the Ground of the IC has now become the negative potential we desire. To make this simplicity work you should be reminded that the system ground and the IC ground are separate with their own distinct personalities. While the inductor output allies with the System Ground the IC ground is our newest negative rail (see [Figure 1](#)). Our Analog power family is now complete!

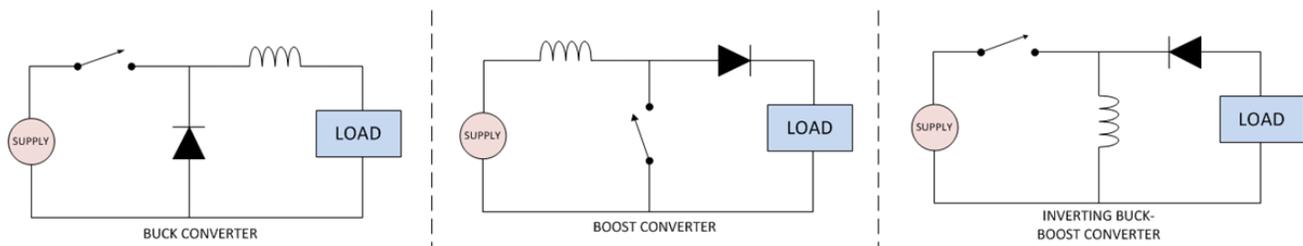


Figure 1. Simplified Switching Power Topology Comparison

The time saved is priceless since the simple reassignment of output terminals has come at no additional component needs and gifted us with an extra rail. To put this saved effort in perspective, imagine the trials and tribulation a flyback or a Ćuk would bring! You suppose this effortless benefit must come at some cost? Indeed, the total operating voltage of the IC is now a sum made up of the absolute output voltage and the input voltage. The total output current is also a little lower, dictated by $[1 - \text{Duty Cycle}]$ times the [Valley current limit]. However nothing else in the realm of components and compensation has changed.

To dig deeper into the design aspects of an inverting buck boost and the many applications it benefits, check out these resources:

- Download the application note, "[Inverting Applications Made SIMPLE with LM46000/1/2 and LM43600/1/2/3.](#)"
- Read the article "[Designing your perfect inverting rail](#)" in ECN Magazine.
- Watch the video "[Inverting made simple.](#)"
- Consider TI's SIMPLE SWITCHER [LM46000/1/2](#) and [LM43600/1/2/3](#) for your next design.

Till next time, thank you for entertaining my little instructional on unleashing the buck!

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