

Single Converter Provides Positive and Negative Supplies

by Jesus Rosales

Charge coupled device (CCD) imagers, LCDs, some op amps and many other circuits require both a positive and negative power supply. Typically, two DC/DC converters are used—one for the positive supply and the other for the negative—but the additional ICs and related circuitry add cost and complexity. There are single converter topologies that develop plus/minus supplies, but usually the second output suffers from poor regulation. In addition, in order to produce a second output of different amplitude, odd transformer turns ratios or post regulators become necessary, which also increases cost, complexity and efficiency losses.

The LT3472 dual DC/DC converter simplifies the design of dual, positive and negative, supplies by combining two switchers that have independent control loops and $\pm 34V$ output ranges. Figure 1 shows a circuit using the LT3472 that produces two independently regulated power supplies from a single Lithium-ion cell: a 15V, 25mA supply, and a -8V, 35mA supply. A useful application for this could be for amplifier circuits which need to output true zero volts with only a single positive supply available. A low current negative supply and boosted positive supply rail permits full amplifier output swing from 0V to $V_{BATTERY}$.

The Schottky rectifying diodes are integrated into the LT3472, which shrinks and simplifies the solution. Each supply requires only one resistor to set its output voltage. The LT3472

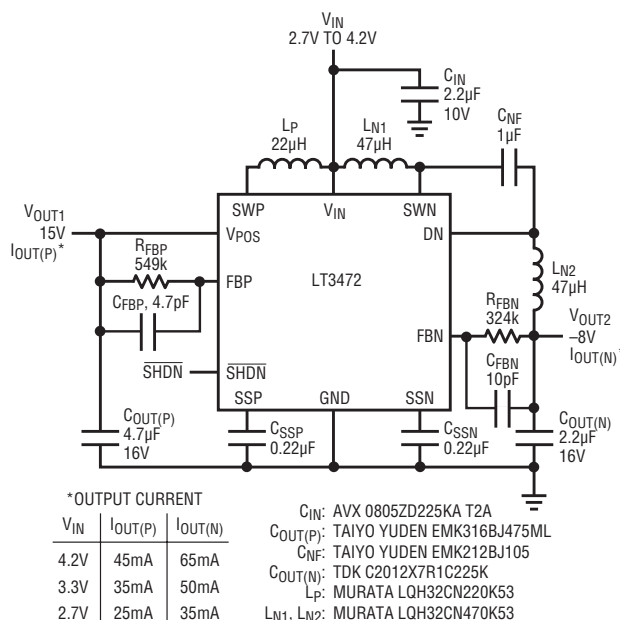


Figure 1. A 1.1MHz, 2.7V–4.2V to 15V, 25mA and -8V, 35mA converter/inverter.

works well with input voltages as high as 16V. The LT3472 also includes an output sequencing feature which allows the negative supply to ramp up only after the positive one has reached 88% of its final value, providing for a controlled turn on as demonstrated in Figure 2. In situations where inrush current is a problem, the LT3472 offers a capacitor-programmable soft start feature that allows the designer to individually program the ramp rate of each output. This feature allows the designer to reduce inrush current to any arbitrary level. Figure 3 shows the supply efficiency.

Figure 4 shows just how compact a dual output circuit can be. 

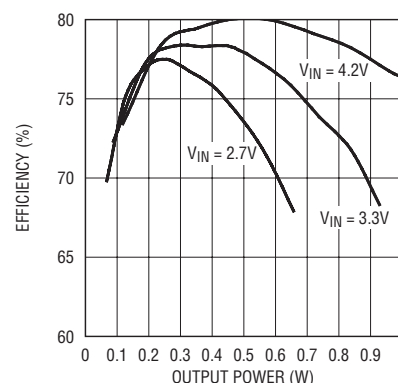


Figure 3. Efficiency for both outputs loaded at 10% load increments

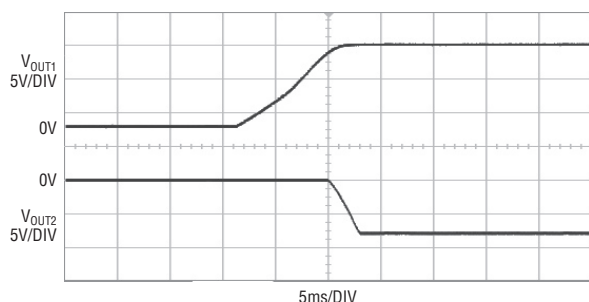


Figure 2. Start up sequence

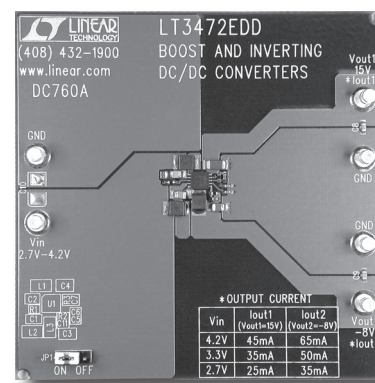


Figure 4. The compact layout of a dual output converter/inverter