

# LT3501

## 3A Dual Monolithic Step-Down DC/DC Converter

### DESCRIPTION

Demo circuit 964A is a dual monolithic step-down DC/DC converter featuring LT3501. The demo circuit is designed for 3.3V and 1.8V outputs from a 4.5V to 24V input. The current capability of each channel is up to 3A. Independent input voltage, feedback, soft-start and power good pins for each channel simplify complex power supply tracking/sequencing requirements.

Both converters are synchronized to either a common external clock input or a resistor programmable 250kHz to 1.5MHz internal oscillator. At all frequencies, a 180° phase shift between channels is maintained, reducing voltage ripple and component size. Programmable frequency allows for optimization between efficiency and external component size.

Minimum input-to-output voltage ratios are improved by allowing the switch to stay on through multiple clock cy-

cles, only switching off when the boost capacitor needs recharging, resulting in ~95% maximum duty cycle.

Each output can be independently disabled using its own soft-start pin, or by using the SHDN pin the entire part can be placed in a low quiescent current shutdown mode.

The LT3501 datasheet gives a complete description of the part, operation and application information. The data-sheet must be read in conjunction with this quick start guide for demo circuit 964A.

**Design files for this circuit board are available. Call the LTC factory.**

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### Performance Summary ( $T_A = 25^\circ\text{C}$ )

| PARAMETER                                        | CONDITION                                  | VALUE             |
|--------------------------------------------------|--------------------------------------------|-------------------|
| Minimum Input Voltage                            |                                            | 4.5V              |
| Maximum Input Voltage                            |                                            | 24V               |
| Output Voltage $V_{OUT1}$                        |                                            | 3.3V $\pm 4\%$    |
| Output Voltage $V_{OUT2}$                        |                                            | 1.8V $\pm 4\%$    |
| Switching Frequency                              |                                            | 500kHz $\pm 20\%$ |
| Maximum Output Current $I_{OUT1}$ and $I_{OUT2}$ | $V_{IN}=4.5\sim 16\text{V}$                | 3.0A              |
|                                                  | $V_{IN}=16\sim 24\text{V}$                 | 2.8A              |
| Voltage Ripple $V_{OUT1}$                        | $V_{IN}=12\text{V}$ , $I_{OUT1}=3\text{A}$ | <10mV             |
| Voltage Ripple $V_{OUT2}$                        | $V_{IN}=12\text{V}$ , $I_{OUT2}=3\text{A}$ | <10mV             |

## QUICK START PROCEDURE

Demo circuit 964A is easy to set up to evaluate the performance of the LT3501. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

**NOTE .** When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the  $V_{IN}$  or  $V_{OUT}$  and GND terminals. See Figure 2 for proper scope probe technique.

1. Place JP1 on the COMBINED position.
2. With power off, connect the input power supply to  $V_{IN1}$  and GND. (Connect another input power supply to  $V_{IN2}$  and GND if INDEPENDENT is selected.)

3. Turn on the power at the input.

**NOTE .** Make sure that the input voltage does not exceed 24V.

4. Check for the proper output voltages.

**NOTE .** If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

5. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

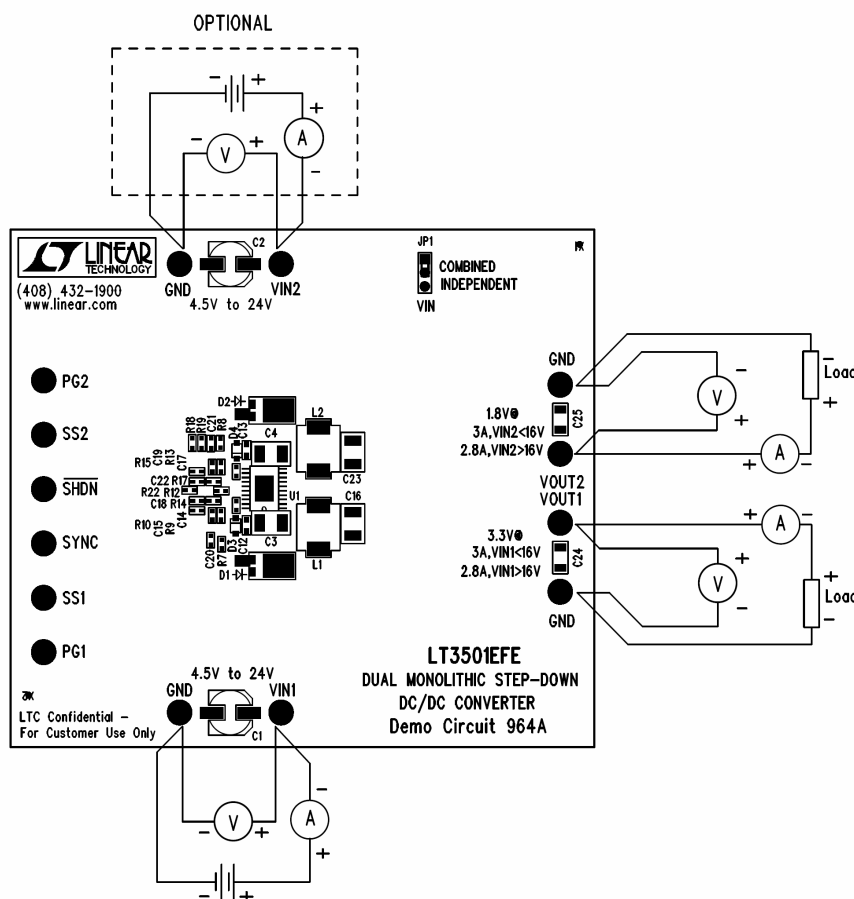
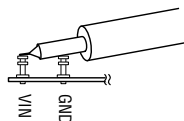


Figure 1. Proper Measurement Equipment Setup



**Figure 2. Measuring Input or Output Ripple**

## ADDITIONAL NOTES

1. Install a 10k resistor at R22 if the board is synchronized from an external signal generator.
2. Different tracking and sequencing schemes can be exercised. However, the Vout1 should stay on for proper operation of Vout2.

