

# 1.1MHz, 500mA, Step-down Regulator in 2mmx2mm DFN

## DESCRIPTION

Demonstration circuit 1221 is a monolithic step-down DC/DC switching regulator featuring the LT3502. The demo circuit is designed for 3.3V output from a 5V to 40V input. The wide input range of the LT3502 allows a variety of input sources including automotive batteries and 24V industrial supplies. The high switching frequency allows the use of tiny, low cost external components. The current mode control scheme creates fast transient response and good loop stability. The boost diode is internal to reduce component count. The  $\overline{\text{SHDN}}$  pin can also be used to program soft start. In this mode, the  $\overline{\text{SHDN}}$  pin is driven through an external RC filter to create a voltage ramp on this pin. The soft start function reduces the input

current surge during start-up. Cycle by cycle current limit and frequency foldback provide the protection against shorted outputs. DA pin can further protect the silicon under fault conditions by sensing the diode current.

The LT3502 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for demo circuit 1221.

**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           |                                                                | 5V                 |
| Maximum Input Voltage           |                                                                | 40V                |
| Output Voltage $V_{\text{OUT}}$ |                                                                | 3.328V $\pm 2.8\%$ |
| Switching Frequency             |                                                                | 1.1MHz $\pm 18\%$  |
| Maximum Output Current          |                                                                | 500mA              |
| Efficiency                      | $V_{\text{IN}} = 12\text{V}$ , $I_{\text{OUT}} = 500\text{mA}$ | 82%                |
| Voltage Ripple                  | $V_{\text{IN}} = 12\text{V}$ , $I_{\text{OUT}} = 500\text{mA}$ | 5mV                |

## QUICK START PROCEDURE

Demonstration circuit 1221 is easy to set up to evaluate the performance of the LT3502. 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 Vin or Vout and GND terminals. See Figure 2 for proper scope probe technique.

1. Place JP1 on the ON position.

2. With power off, connect the input power supply to Vin and GND.

3. Turn on the power at the input.

**NOTE.** Make sure that the input voltage does not exceed 40V.

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.

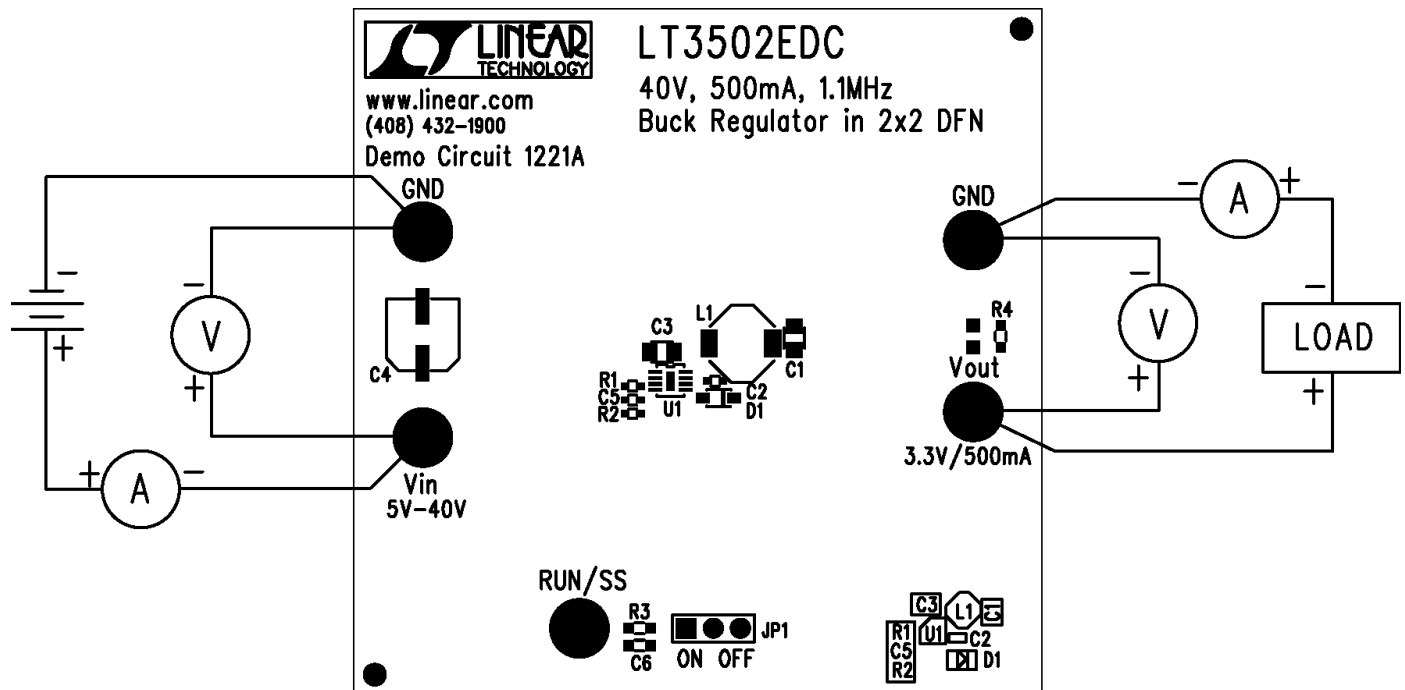


Figure 1. Proper Measurement Equipment Setup

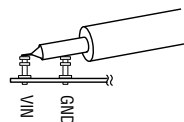
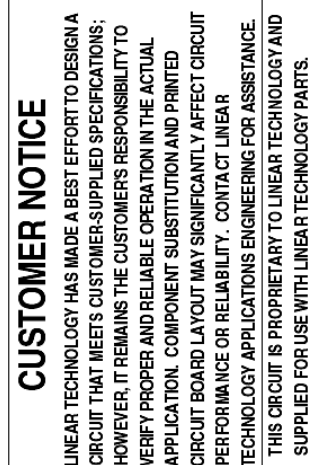


Figure 2. Measuring Input or Output Ripple



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