

## DESCRIPTION

Demonstration Circuit 1232 is a high voltage 500mA 200kHz buck converter with burst mode featuring the LT<sup>®</sup>3437IFE. The board is optimized for 3.3V output at up to 400mA load current for a steady state input voltage range of 3.7V to 60V\* with input transients up to 80V. *\*Minimum on-time restrictions and 3.3V output may limit the steady state maximum input voltage to 42V before pulse skipping occurs. Up to 60V DC input is allowable for the LT3437, but with higher output voltages than 3.3V. 80V input is allowable for a short transient regardless of output voltage.* With its wide input voltage range, 500mA internal power switch, 100uA supply current (at input voltages above 14V), 200kHz switching frequency and thermally enhanced package, the LT3437IFE is a very versatile and powerful IC for DC/DC converters that require compact space, high efficiency at both heavy and light loads and high input voltage.

The LT3437 200kHz switching frequency allows all of the components to be small, surface mount devices. Synchronization with an external clock of up to 700kHz is possible. The current-mode control topology creates fast transient response and good loop stability with a minimum number of external components. The low resistance internal power switch (0.8 $\Omega$ ) achieves high efficiencies of up to 81%. The shutdown pin can be used to program undervoltage

lockout or place the part in micropower shutdown, reducing supply current to less than 1 $\mu$ A. Burst Mode<sup>™</sup> reduces zero load current to under 100 $\mu$ A at most input voltages while maintaining a regulated output. Burst Mode can be defeated or enabled by setting the Burst Mode jumper position. When Burst Mode is defeated, the IC runs at constant frequency without skipping pulses at light load. This provides low output ripple at light load, but the quiescent current (1-2mA) is higher than in burst mode. The soft start function reduces inrush current and output voltage overshoot during startup.

The LT3437 datasheet gives a complete description of the part, operation and applications information. The datasheet must be read in conjunction with this Quick Start Guide for demonstration circuit 1232. The LT3437IFE is assembled in a small 16-pin thermally enhanced package with exposed pad where proper board layout is essential for maximum thermal performance. See the datasheet section 'Layout Considerations'.

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

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LT is a trademark of Linear Technology Corporation

## QUICK START PROCEDURE

Demonstration circuit 1232 is easy to set up to evaluate the performance of the LT3437. Refer to Figure 5 for proper measurement equipment setup and follow the procedure below:

**NOTE:** The synchronization and shutdown functions are optional and their terminals can be left floating (disconnected) if they are not being used.

**NOTE:** Do not hot-plug the input voltage terminal VIN. The absolute maximum voltage on VIN is 80V and

hot-plugging a power supply through wire leads to the demonstration circuit can cause the voltage on the extremely low-ESR ceramic input capacitor to ring to twice its DC value. This is due to high currents instantaneously generated in the inductive supply leads from an input voltage step on the low-ESR ceramic input capacitor. A bulky higher-ESR capacitor and an additional inductive filter can be added to the circuit to dampen hot-plug transient ringing. *See Application Note 88 for more details.* In order to protect the IC, a

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1232

## HIGH VOLTAGE 500mA 200kHz BUCK CONVERTER WITH BURST MODE

transient voltage suppressor diode can be added between VIN and GND terminals to absorb any high voltage transient ringing that may occur due to hot-plugging.

1. After all connections are made with power off, turn on input power and verify that the output voltage is 3.3V.

**NOTE:** If the output voltage is low, disconnect the load to make sure that it is not too high.

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

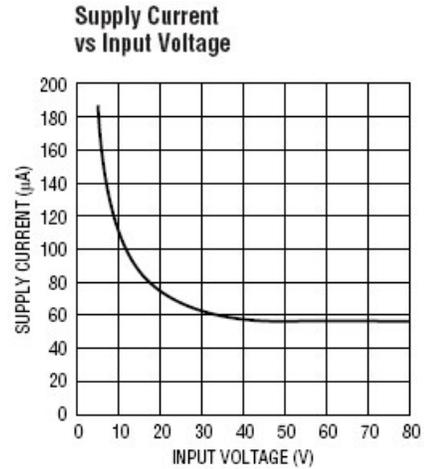


Figure 2. DC1232 Typical Supply Current in Burst Mode

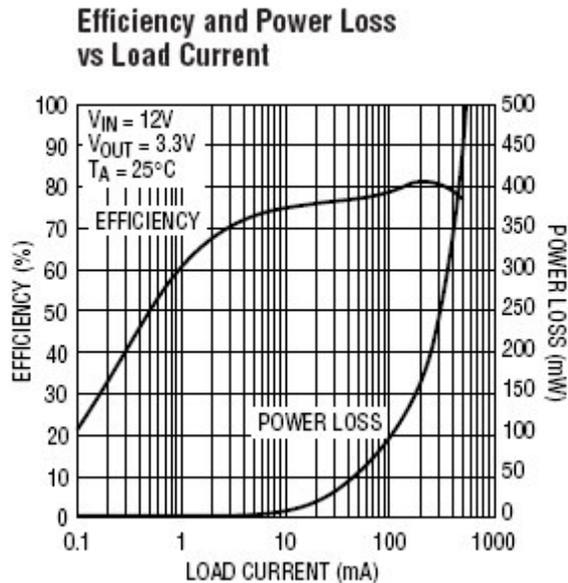


Figure 1. DC1232A Typical Efficiency

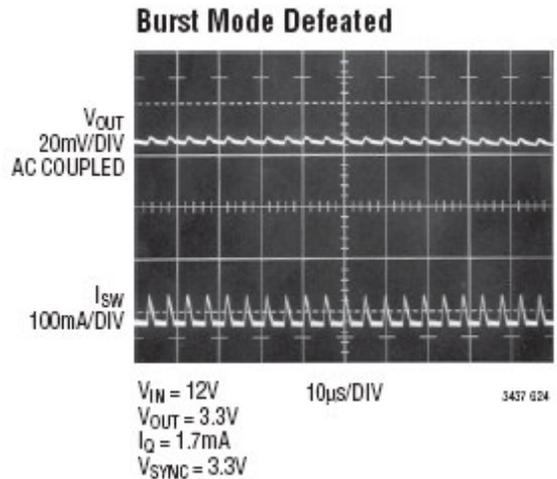


Figure 3. Output Ripple with Burst Mode Defeat. With Burst Mode Enabled, zero load ripple may be as high as 30mV under the same conditions.

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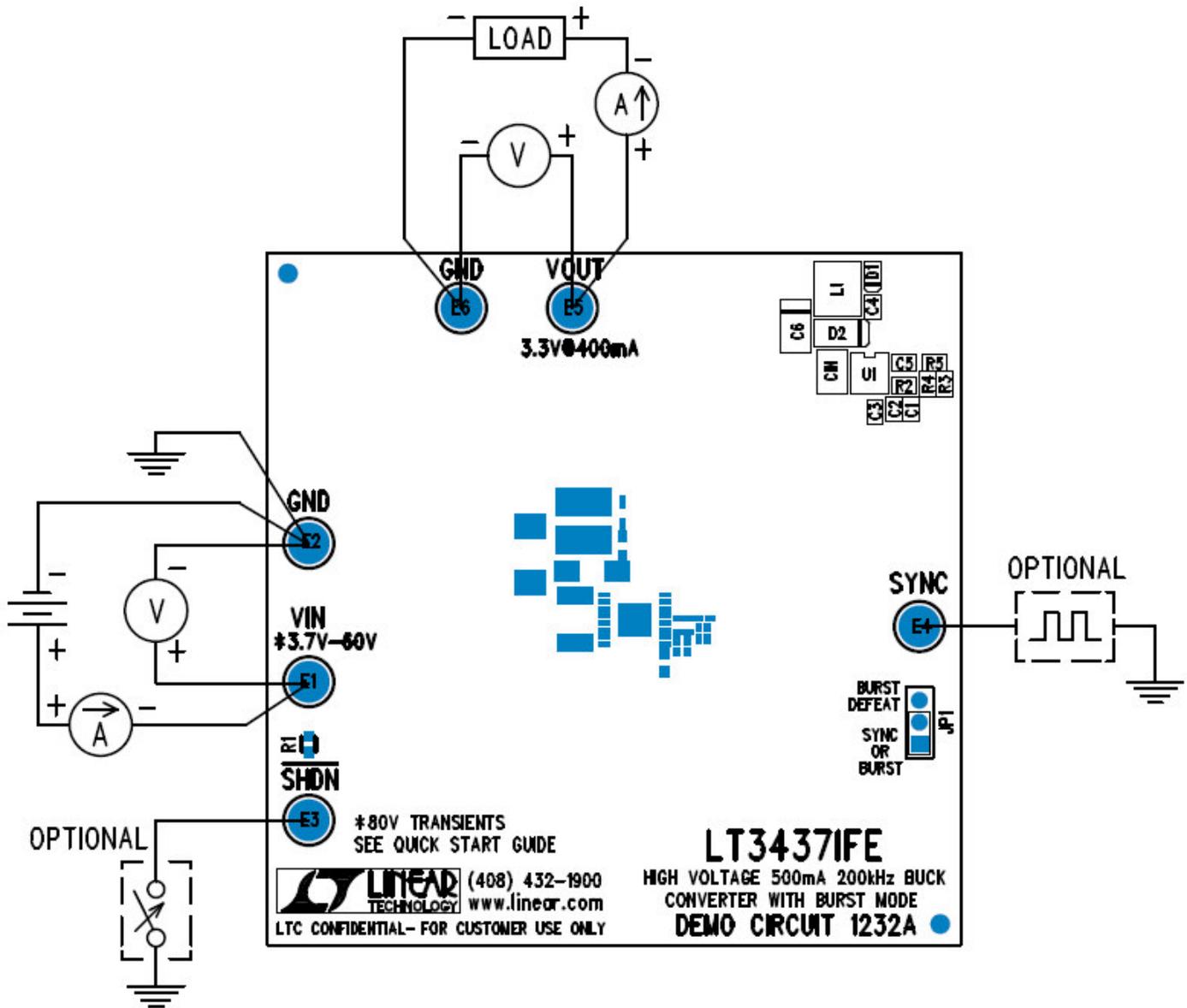
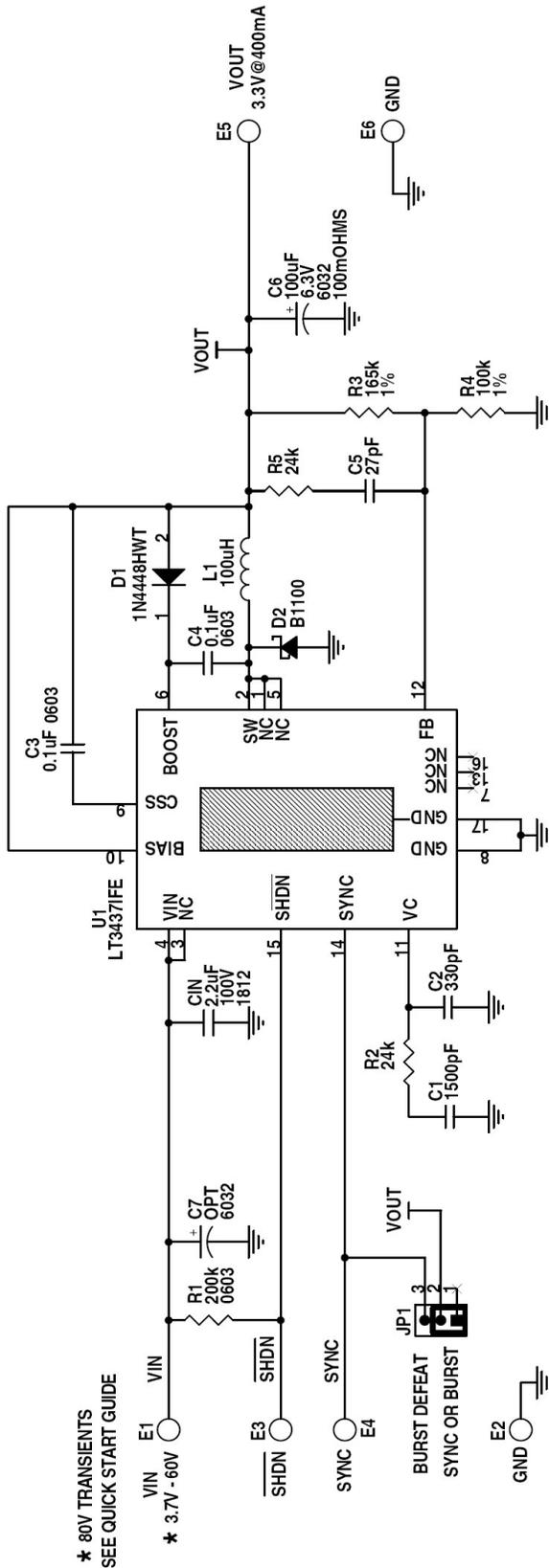


Figure 5. Proper Measurement Equipment Setup

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1232

## HIGH VOLTAGE 500mA 200kHz BUCK CONVERTER WITH BURST MODE



\* 80V TRANSIENTS  
SEE QUICK START GUIDE

\* 3.7V -60V

### NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402.  
ALL CAPACITORS ARE IN MICROFARADS, 0402.

### CUSTOMER NOTICE

LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

### CONTRACT NO.

APPROVALS

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TITLE: SCHEMATIC

HIGH VOLTAGE 500mA 200kHz BUCK CONVERTER WITH BURST MODE

SIZE DWG NO. **DC1232A \* LT3437IFE**

REV **A**

DATE: Monday, April 30, 2007

SHEET 1 OF 1