

## 3.5A, 33V Step-down Switching Regulator with SYNC Function

### DESCRIPTION

Demonstration circuit 1458 is a monolithic step-down DC/DC switching regulator featuring LT3972. The LT3972 can be synchronized over a 250 KHz to 2 MHz range. The demo board is designed for 5V output from a 6.3V to 33V input with transient up to 62V. The wide input range of the LT3972 allows a variety of input sources. The typical sources are automotive batteries, wall adaptors and industrial supplies. The modes of operation (Burst Mode or synchronization) are jumper selectable. The Burst Mode operation increases the efficiency at light loads.

The current mode control scheme creates fast transient response and good loop stability. The gate drive of the internal switch is boosted to a voltage that is higher than the  $V_{in}$  to ensure saturation of the switch. The LT3972's integrated boost

diode reduces the parts count. The RUN/SS pin can be used to set the part in micropower shut-down mode, reducing the supply current to less than 1uA. The RUN/SS pin can also be used to program soft start. In this mode, the RUN/SS 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.

The LT3972 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 1458.

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

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### Performance Summary for Step-down Switching Regulator ( $T_A = 25^{\circ}\text{C}$ )

PARAMETER FOR BUCK REGULATOR	CONDITION	VALUE
Minimum Input Voltage		6.3V
Maximum Input Voltage		33V
Output Voltage $V_{OUT}$		5V +/- 5%
Maximum Output Current		3.5A
Typical Switching Frequency		600kHz

### QUICK START PROCEDURE

Demonstration circuit 1458 is easy to set up to evaluate the performance of the LT3972. 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 RUN position.
2. With power off, connect the input power supply to  $V_{in}$  and GND.
3. Turn on the power at the input.
4. Check for the proper output voltage.

**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.
6. An external clock can be added to the SYNC pin when SYNC function is used. See synchronization section in the datasheet for detail

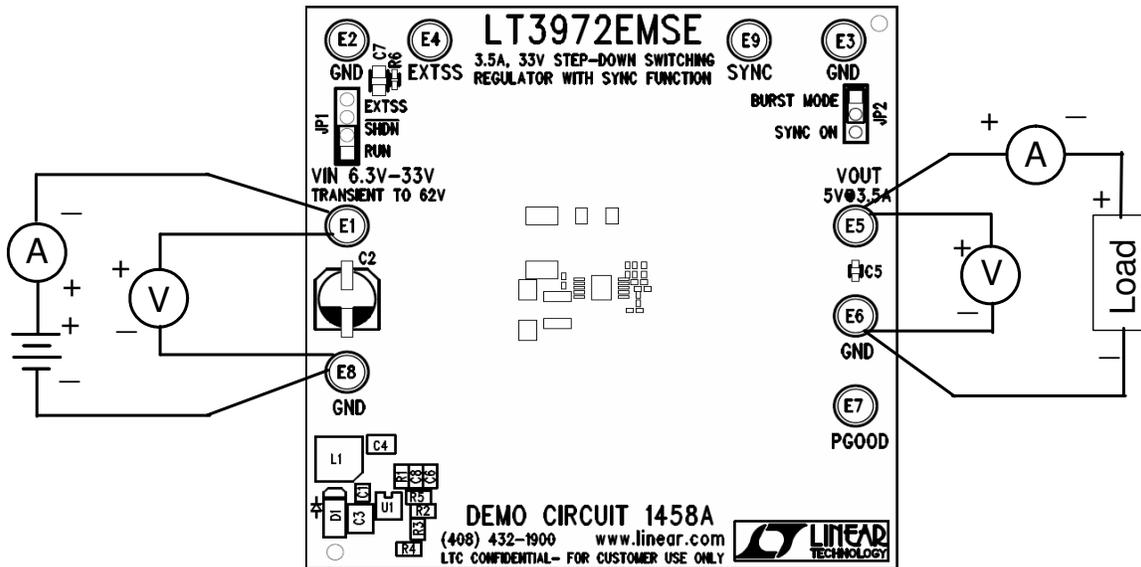


Figure 1. Proper Measurement Equipment Setup

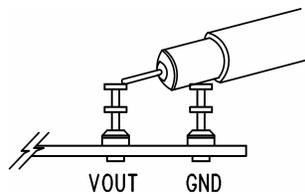
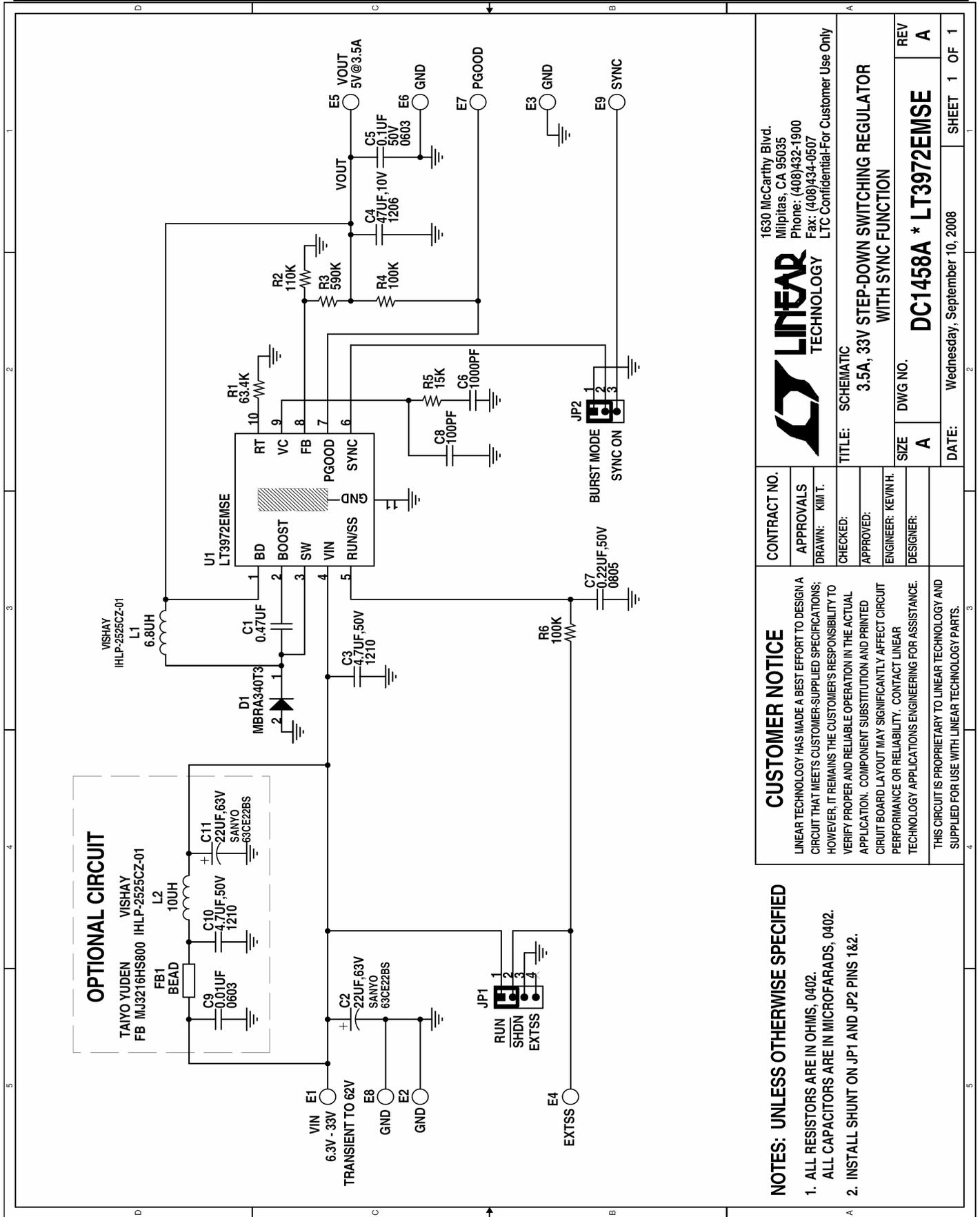


Figure 2. Measuring Input or Output Ripple



**OPTIONAL CIRCUIT**  
 TAIYO YUDEN VISHAY  
 FB MJ3216HS800 IHL P-2525CZ-01  
 L2 100UH  
 C10 4.7UF, 50V SANYO 63CE22BS  
 C9 0.01UF 0603  
 C11 22UF, 63V SANYO 63CE22BS  
 FB1 BEAD

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**APPROVALS**  
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 CHECKED:  
 APPROVED:  
 ENGINEER: KEVIN H.  
 DESIGNER:

**TITLE:** SCHEMATIC  
**3.5A, 33V STEP-DOWN SWITCHING REGULATOR WITH SYNC FUNCTION**

**SIZE:** A  
**DWG NO.:** DC1458A \* LT3972EMSE  
**REV:** A

**DATE:** Wednesday, September 10, 2008  
**SHEET:** 1 OF 1

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

- NOTES: UNLESS OTHERWISE SPECIFIED**
1. ALL RESISTORS ARE IN OHMS, 0402.  
 ALL CAPACITORS ARE IN MICROFARADS, 0402.
  2. INSTALL SHUNT ON JP1 AND JP2 PINS 1&2.



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