

## DESCRIPTION

Demonstration circuit 1527 is a monolithic step-down DC/DC switching regulator featuring the LT3971. The switching frequency is adjustable up to 2MHz. The demo circuit is designed for 3.3V, 1.2A output from a 4.5V to 38V input. The wide input range of the LT3971 allows a variety of input sources including automotive batteries and 24V industrial supplies. Low ripple Burst Mode increases the efficiency at the light load while keeping the output ripple below 15mV. The part is in shutdown when the EN pin is low and active when the pin is high. The threshold of the EN pin is accurate at 1V with 30mV of hysteresis. When  $V_{in}$  is above 6V, adding a resistor divider from  $V_{in}$  to EN can program the LT3971 to regulate the output only when  $V_{in}$  is above a desired voltage.

The circuit consumes only 2.8 $\mu$ A of quiescent current. The boost diode, control and logic circuit are integrated to reduce the components count and solution size. The current mode control scheme creates fast transient response and good loop stability.

The LT3971 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 1527.

**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         |                                             | 38V              |
| Output Voltage $V_{out}$      |                                             | 3.307 $\pm$ 2.5% |
| Typical switching Frequency   |                                             | 800kHz           |
| Maximum Output Current        |                                             | 1.2A             |
| Typical efficiency            | $V_{in}=12\text{V}$ , $I_{out}=1.2\text{A}$ | 82.43%           |
| Typical output voltage Ripple | $V_{in}=12\text{V}$ , $I_{out}=1.2\text{A}$ | 10mV             |

## QUICK START PROCEDURE

Demonstration circuit 1527 is easy to set up to evaluate the performance of the LT3971. 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 ON position.
2. Place JP2 on the RT FREQ position.
3. With power off, connect the input power supply to  $V_{in}$  and GND.
4. Turn on the power at the input.

**NOTE .** Make sure that the input voltage does not exceed 38V.

5. 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.

6. 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.

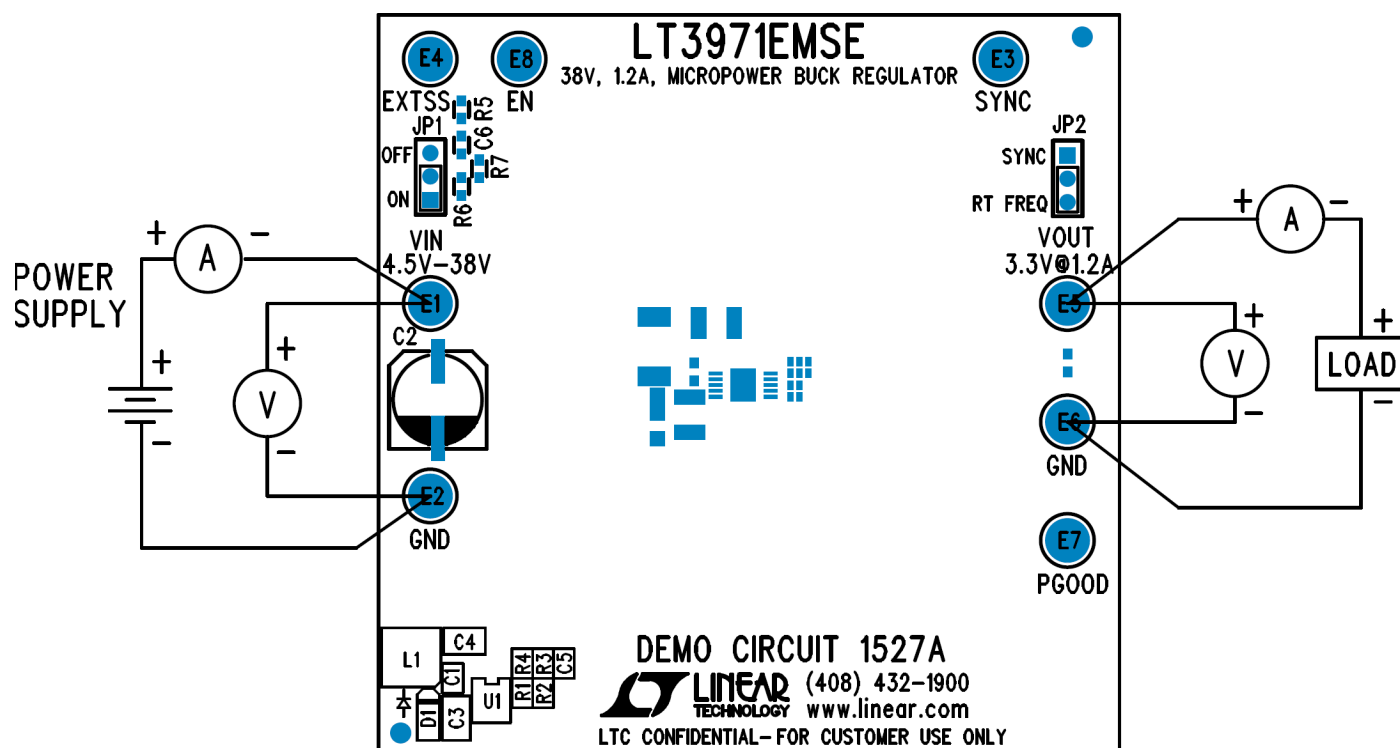


Figure 1. Proper Measurement Equipment Setup

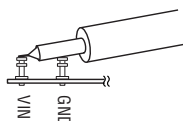
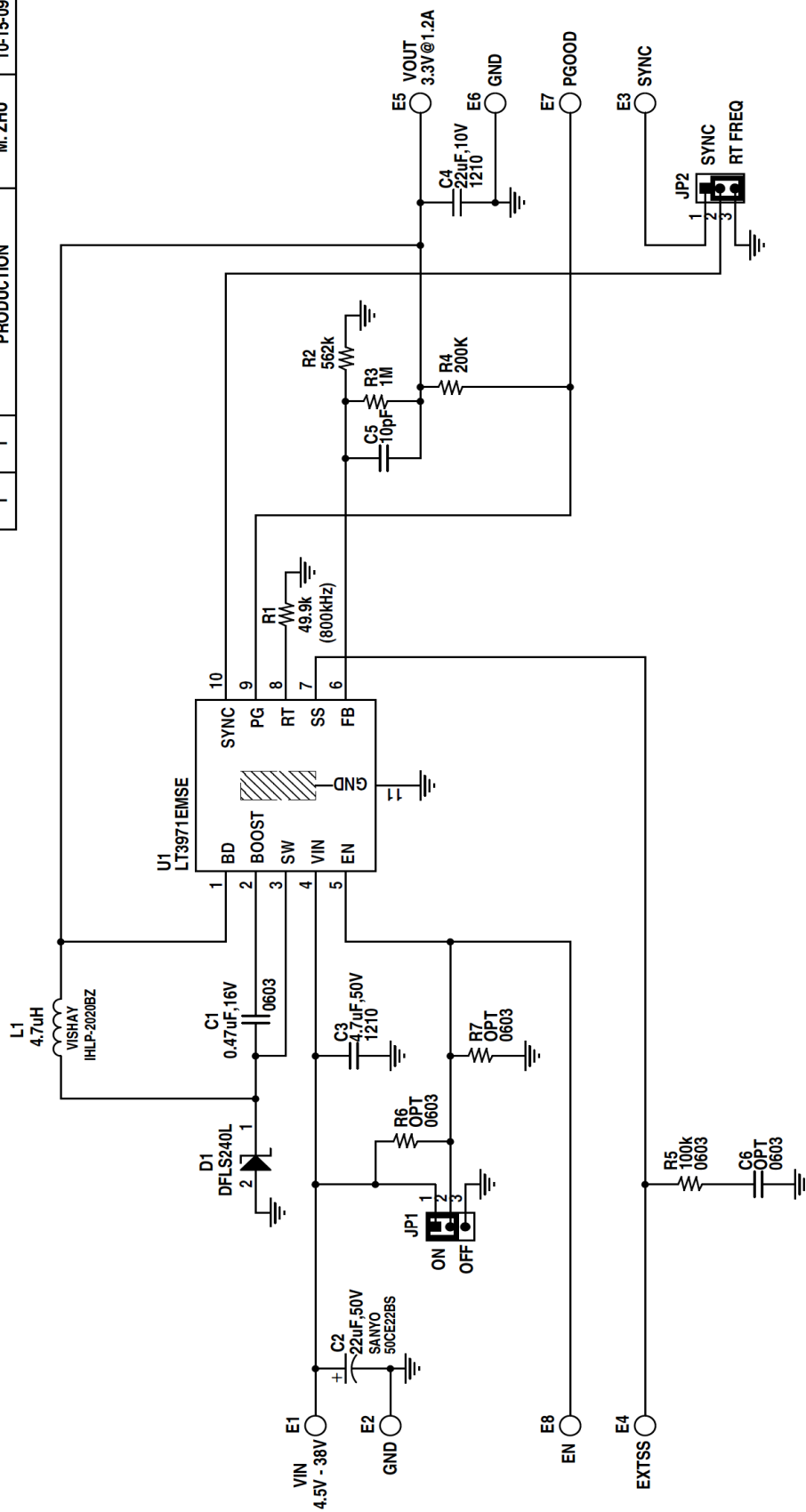


Figure 2. Measuring Input or Output Ripple

| REVISION HISTORY |     |             |                 |
|------------------|-----|-------------|-----------------|
| ECO              | REV | DESCRIPTION | APPROVED DATE   |
| 1                | 1   | PRODUCTION  | M. ZHU 10-15-09 |



## NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402.  
ALL CAPACITORS ARE IN MICROFARADS, 0402.
2. INSTALL SHUNTS AS SHOWN.

## 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.**

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|-----------------|
| CONTRACT NO.    |
| APPROVALS       |
| CB DES. K. TRAN |
| ENG. M. ZHU     |
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**LINEAR**  
TECHNOLOGY

**TITLE: SCHEMATIC**

## 38V, 1.2A, MICROPOWER BUCK REGULATOR

|                                  |                                  |              |
|----------------------------------|----------------------------------|--------------|
| SIZE                             | IC NO.                           | REV          |
| A                                | LT3971EMSE<br>DEMO CIRCUIT 1527A | 1            |
| DATE: Thursday, October 15, 2009 |                                  | SHEET 1 OF 1 |