

# LTC3261EMSE

## High Voltage, Low Noise Inverting Charge Pump

### DESCRIPTION

Demonstration circuit 1882A is a high voltage inverting charge pump featuring the LTC<sup>®</sup>3261EMSE. The LTC3261 operates with an input voltage from 4.5V to 32V. The demo board provides the means to select between Burst Mode<sup>®</sup> operation or constant-frequency mode operation, plus select an operating frequency of 500kHz, 200kHz, and 50kHz.

The LTC3261 data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1882A.

**Design files for this circuit board are available at <http://www.linear.com/demo>**

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### PERFORMANCE SUMMARY Specifications are at T<sub>A</sub> = 25°C

| SYMBOL           | PARAMETER      | CONDITIONS             | MIN | TYP   | MAX | UNITS  |
|------------------|----------------|------------------------|-----|---|-----|--------|
| V <sub>IN</sub>  | Input Voltage  |                        | 4.5 |   | 32  | V      |
| V <sub>OUT</sub> | Output Voltage | MODE = 0V<br>MODE ≥ 2V |     | -V <sub>IN</sub><br>-0.94 • V <sub>IN</sub> |     | V<br>V |

### QUICK START PROCEDURE

Refer to Figure 1 for the proper measurement equipment setup and jumper settings, 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<sub>IN</sub> or V<sub>OUT</sub> and GND terminals. See Figure 2 for proper scope probe technique.

1. Make sure the jumper settings are as follows:

- JP1:** EN is in the ON position.
- JP2:** MODE is in the BURST position.
- JP3:** FREQ is in the 500kHz position.

2. Set PS1 to 15V and turn on supply.
3. Slowly increase the load from 0mA to -100mA and observe the output voltage and output ripple.
4. Set the load to 0mA.
5. Move the MODE jumper, JP2, from the BURST position to the CONT FREQ position and then repeat step 3.
6. Set the load to 0mA.
7. Move the FREQ jumper, JP3, from the 500kHz position to the 200kHz position.
8. Slowly increase the load from 0mA to -50mA and observe the output voltage and output ripple.
9. Set the load to 0mA.

## QUICK START PROCEDURE

10. Move the FREQ jumper, JP3, from the 200kHz position to the 50kHz position.
11. Slowly increase the load from 0mA to -10mA and observe the output voltage and output ripple.
12. Turn off the load and PS1.
13. Set up the load, AM2 and VM2, for the power conversion efficiency measurement, as illustrated in Figure 3.
14. Set the MODE jumper, JP2, to the BURST position and the FREQ jumper, JP3, to the 500kHz position.
15. Set PS1 to 15V and turn on the supply.
16. Set the load to a desired current from 0mA to 100mA.
17. Calculate the power conversion efficiency from the following formula:

$$\text{Efficiency} = \frac{V_L \cdot I_L}{V_S \cdot I_S} \cdot 100\%$$

Figures 4 and 5 illustrate how the power conversion efficiency varies with load current in Burst Mode operation and in constant-frequency mode operation.

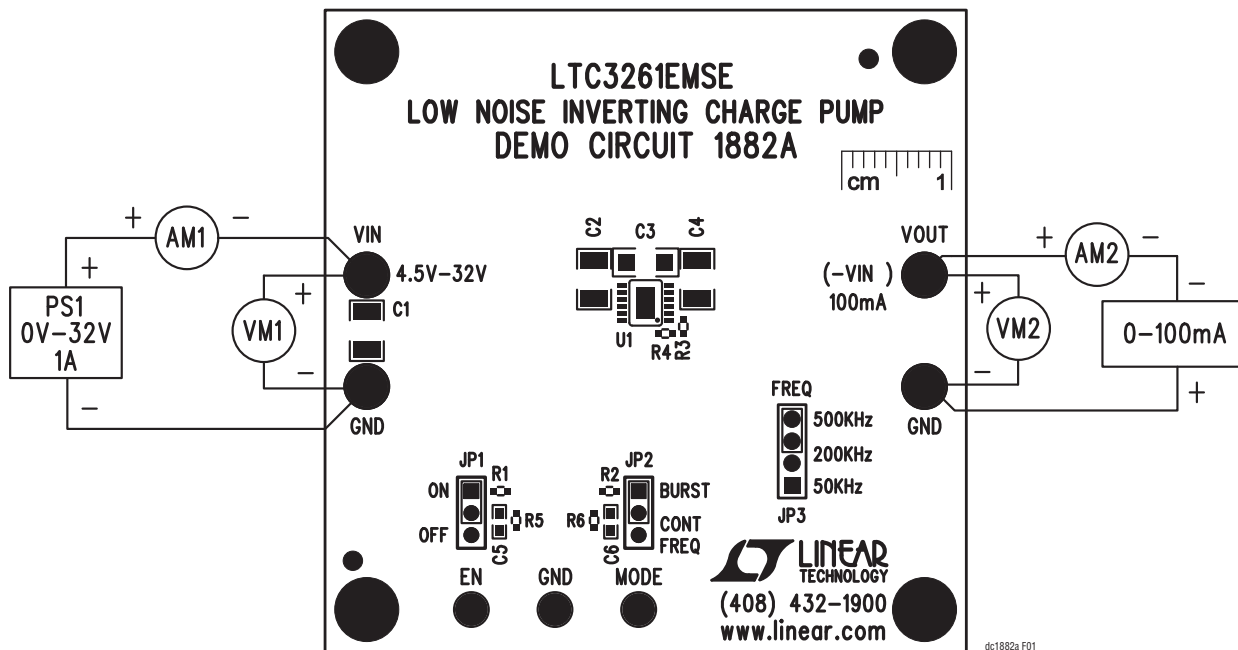


Figure 1. Proper Measurement Equipment Setup for DC1882A

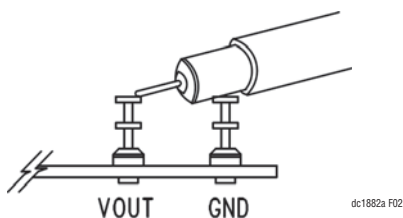


Figure 2. Measuring Input or Output Ripple

**QUICK START PROCEDURE**

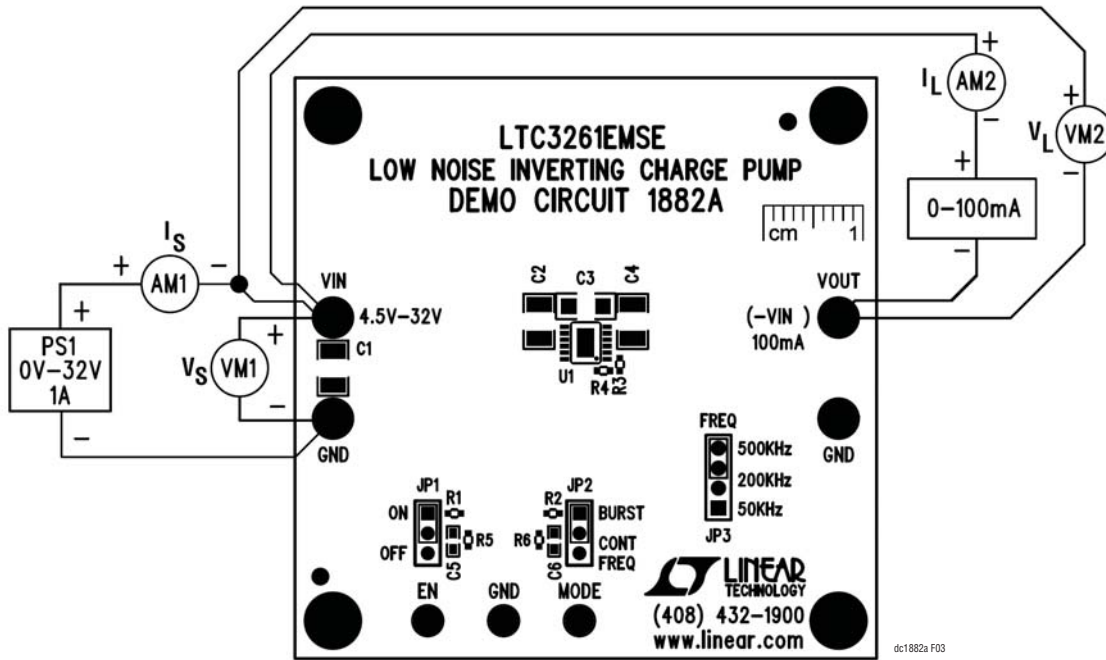


Figure 3. Power Conversion Efficiency Measurement Setup

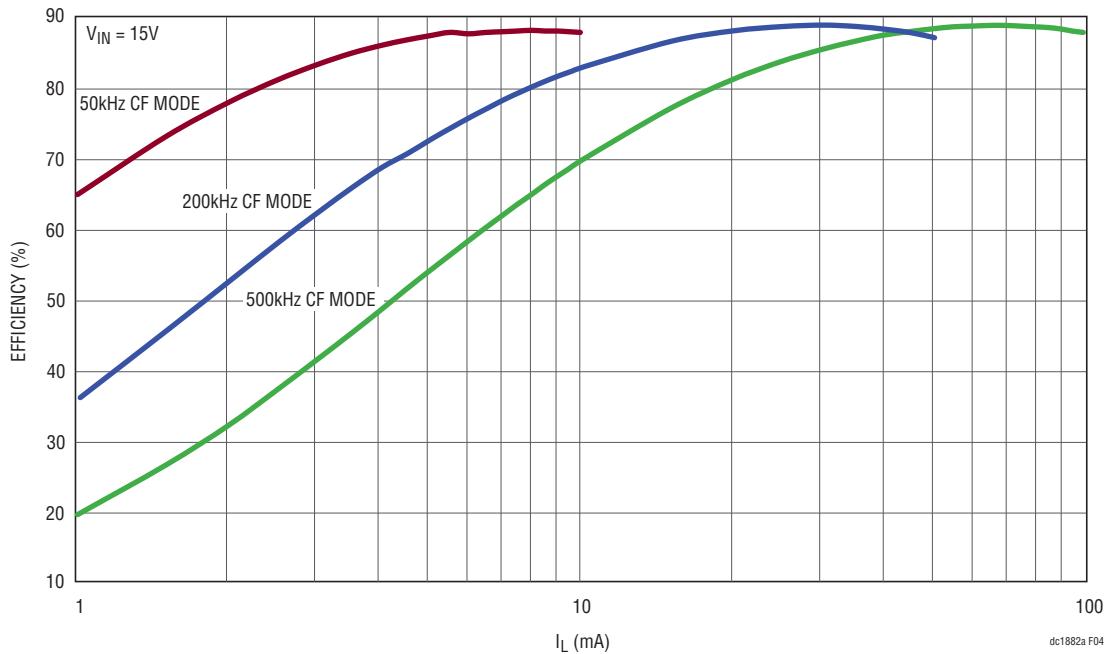


Figure 4. LTC3261 Constant-Frequency Mode Operation Power Conversion Efficiency

## QUICK START PROCEDURE

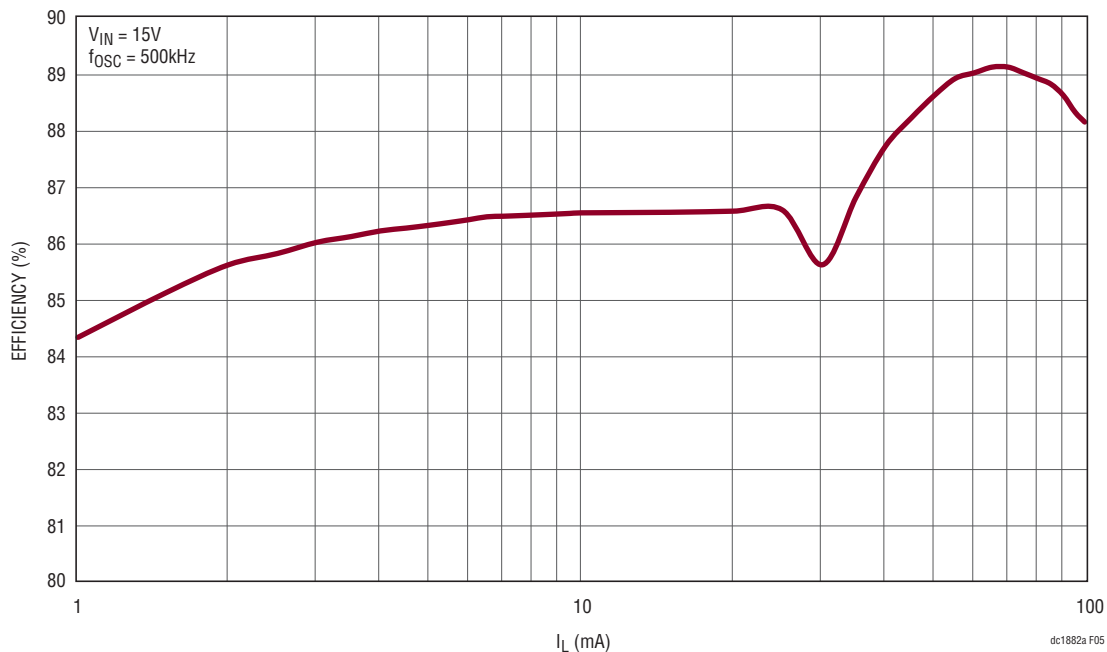
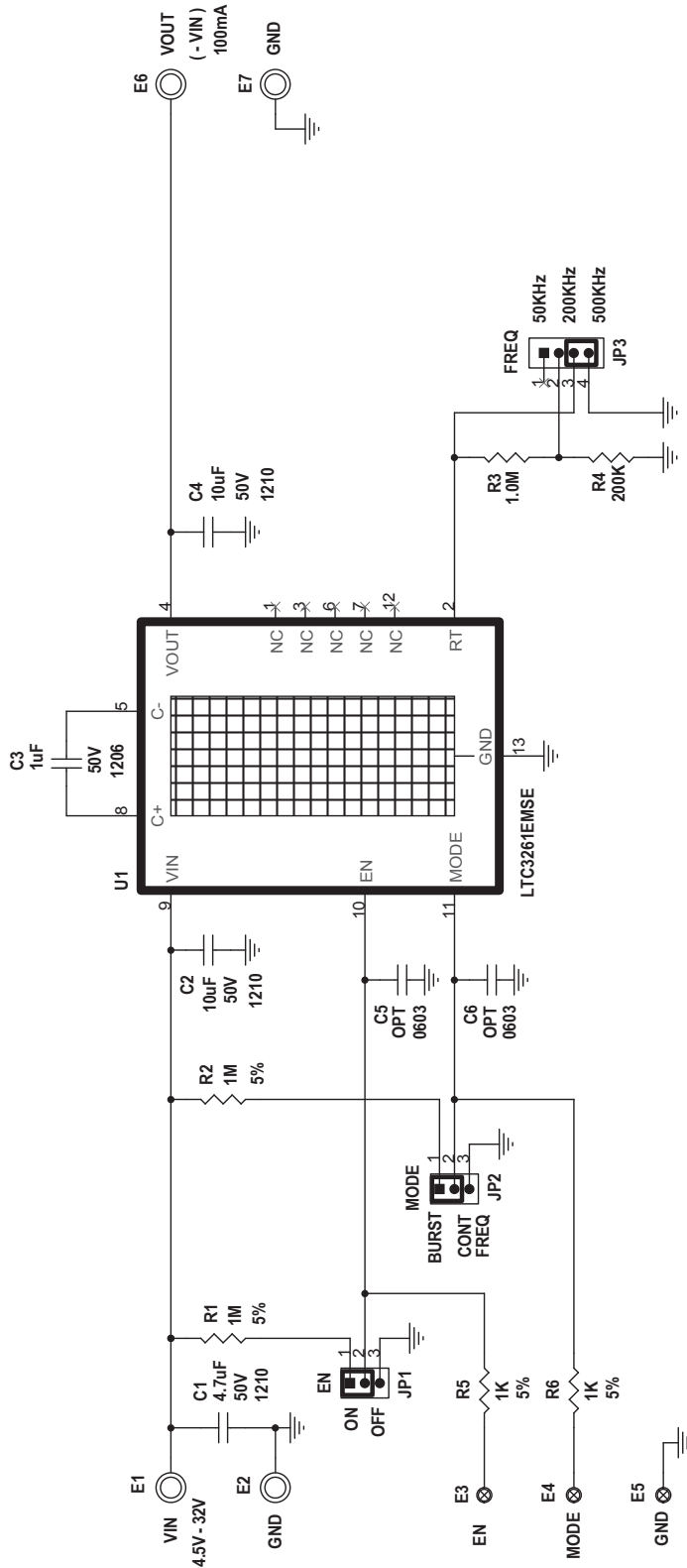


Figure 5. LTC3261 Burst Mode Operation Power Conversion Efficiency

## PARTS LIST

| ITEM  | QTY | REFERENCE      | PART DESCRIPTION                     | MANUFACTURER/PART NUMBER           |
|---|-----|----------------|--------------------------------------|------------------------------------|
| <b>DC1826A Required Circuit Components</b>      |     |                |                                      |                                    |
| 1   | 2   | C2, C4         | CAP, CER, 10µF, 50V, X7S, 10%, 1210  | TDK, C3225X7S1H106K                |
| 2   | 1   | C3             | CAP, CER, 1µF, 50V, X7R, 10%, 1206   | MURATA, GRM31MR71H105KA88          |
| 5   | 1   | U1             | LOW NOISE INVERTING CHARGE PUMP      | LINEAR TECHNOLOGY, LTC3261EMSE#PBF |
| <b>Additional Demo Board Circuit Components</b> |     |                |                                      |                                    |
| 1   | 1   | C1             | CAP, CER, 4.7µF, 50V, X7R, 10%, 1210 | MURATA, GRM32ER71H475KA88L         |
| 3   | 2   | R1, R2         | RES, 1MΩ, 1/16W, 5%, 0402, SMD       | VISHAY, CRCW04021M00JNED           |
| 4   | 2   | R3             | RES, 1MΩ, 1/16W, 1%, 0402, SMD       | VISHAY, CRCW04021M00FKED           |
| 5   | 1   | R4             | RES, 200k, 1/10W, 1%, 0402, SMD      | VISHAY, CRCW0402200KFKED           |
| <b>Hardware: For Demo Board Only</b>            |     |                |                                      |                                    |
| 1   | 3   | JP1-JP2        | HEADER, 3 PIN, 1 ROW, 0.079"         | SAMTEC, TMM-103-02-L-S             |
| 2   | 1   | JP3            | HEADER, 4 PIN, 1 ROW, 0.079"         | SAMTEC, TMM-104-02-L-S             |
| 3   | 3   | JP1-JP3        | SHUNT, 2mm                           | SAMTEC, 2SN-KB-G                   |
| 4   | 4   | E1, E2, E6, E7 | TP, TURRET, 0.094", PBF              | MILL-MAX, 2501-2-00-80-00-00-07-0  |
| 5   | 3   | E3, E4, E5     | TURRET, 0.061", DIA                  | MILL-MAX, 2308-2-00-80-00-00-07-0  |

**SCHEMATIC DIAGRAM**



|  |  |                  |  |  |  |
|--|--|------------------|--|--|--|
| <b>CUSTOMER NOTICE</b>   |  | <b>APPROVALS</b> |  | 1630 McCarthy Blvd.<br>Milpitas, CA 95035<br>Phone: (408)432-1900 www.linear.com<br>Fax: (408)434-0507<br>LTC Confidential-For Customer Use Only |  |
| LINEAR TECHNOLOGY  |  | NC               |  | TITLE: SCHEMATIC   |  |
| LOW NOISE INVERTING CHARGE PUMP  |  | MARTY M.         |  | REV. 1   |  |
| IC NO. LTC3261EMSE   |  | SCALE = NONE     |  | DATE: 03-12-12   |  |
| SIZE N/A   |  | SHEET 1 OF 1     |  | REV. 1   |  |
| DEMO CIRCUIT 1882A   |  |                  |  |  |  |
| THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.  |  |                  |  |  |  |
| 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. |  |                  |  |  |  |

**NOTE: UNLESS OTHERWISE SPECIFIED**

1. ALL RESISTORS ARE 0402, 1%, 1/16W
2. INSTALL SHUNTS AS SHOWN.

Figure 10. LTC3261 Low Noise Inverting Charge Pump

# DEMO MANUAL DC1882A

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## DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

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**Please read the DEMO BOARD manual prior to handling the product.** Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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