

# LT3758AEMSE

## High Efficiency SEPIC Converter

### DESCRIPTION

Demonstration circuit 1342B features the [LT<sup>®</sup>3758AEMSE](#) in a 300kHz SEPIC converter circuit, designed for a 24V output from a 18V to 72V input.

The LT3758A operates over an input range of 5.5V to 100V, suitable for automotive, telecom and industrial applications. It also exhibits a low shutdown current of 1 $\mu$ A, making it ideal for battery-operated systems. Thanks to a novel FBX pin architecture, the LT3758A can be connected directly to a resistor divider from either a positive output voltage or a negative output voltage to ground. It also packs many popular features such as soft-start, input undervoltage

lockout, adjustable frequency and clock synchronization in a small 10-lead MSOP package or a 3mm  $\times$  3mm QFN package.

The LT3758A data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1342B.

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

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### PERFORMANCE SUMMARY 300kHz SEPIC Regulator. Specifications are at T<sub>A</sub> = 25°C

| PARAMETER              | CONDITIONS | MIN   | TYP | MAX   | UNITS |
|------------------------|------------|-------|-----|-------|-------|
| Input Supply Range     |            | 18    |     | 72    | V     |
| Output Voltage         |            | 23.28 | 24  | 24.72 | V     |
| Maximum Output Current |            |       |     | 1     | A     |
| Switching Frequency    |            |       | 300 |       | kHz   |

## QUICK START PROCEDURE

Demonstration circuit 1342B is easy to set up to evaluate the performance of the LT3758AEMSE. 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. With power off, connect the input power supply to  $V_{IN}$  and GND.

3. Turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed the maximum input voltage.

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.

Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

**QUICK START PROCEDURE**

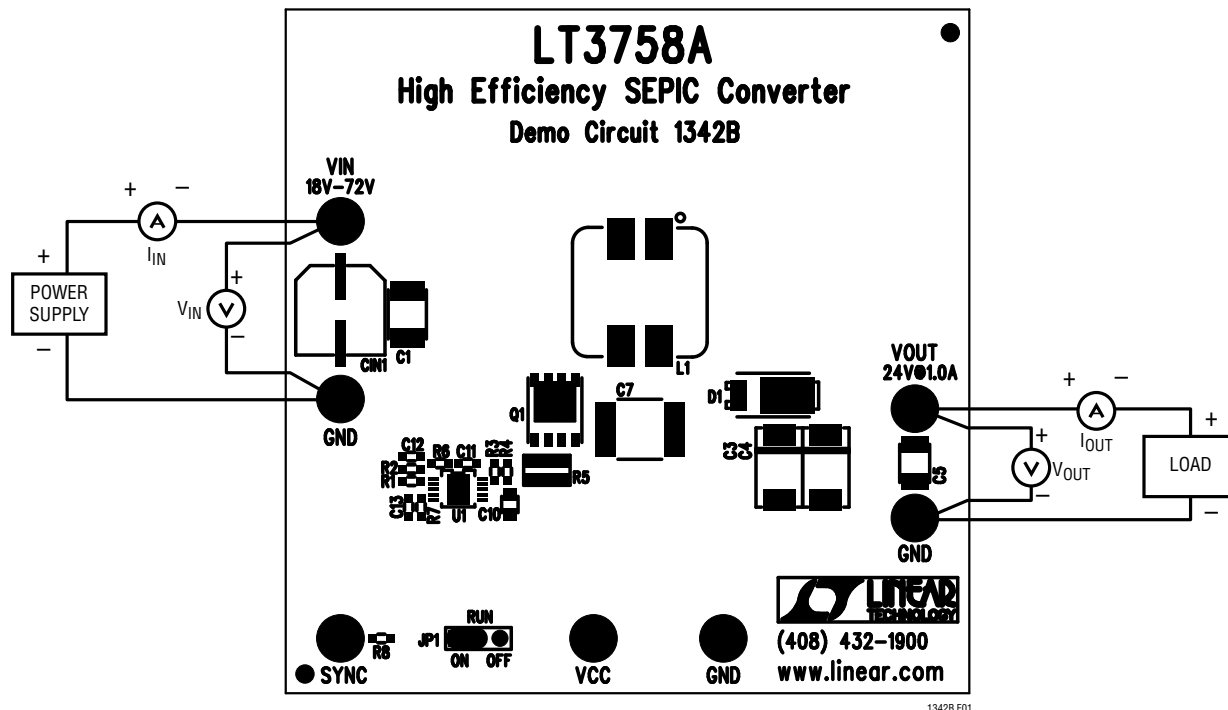


Figure 1. Proper Measurement Equipment Setup

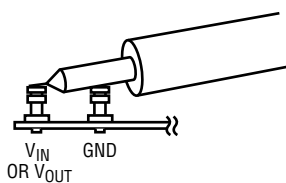


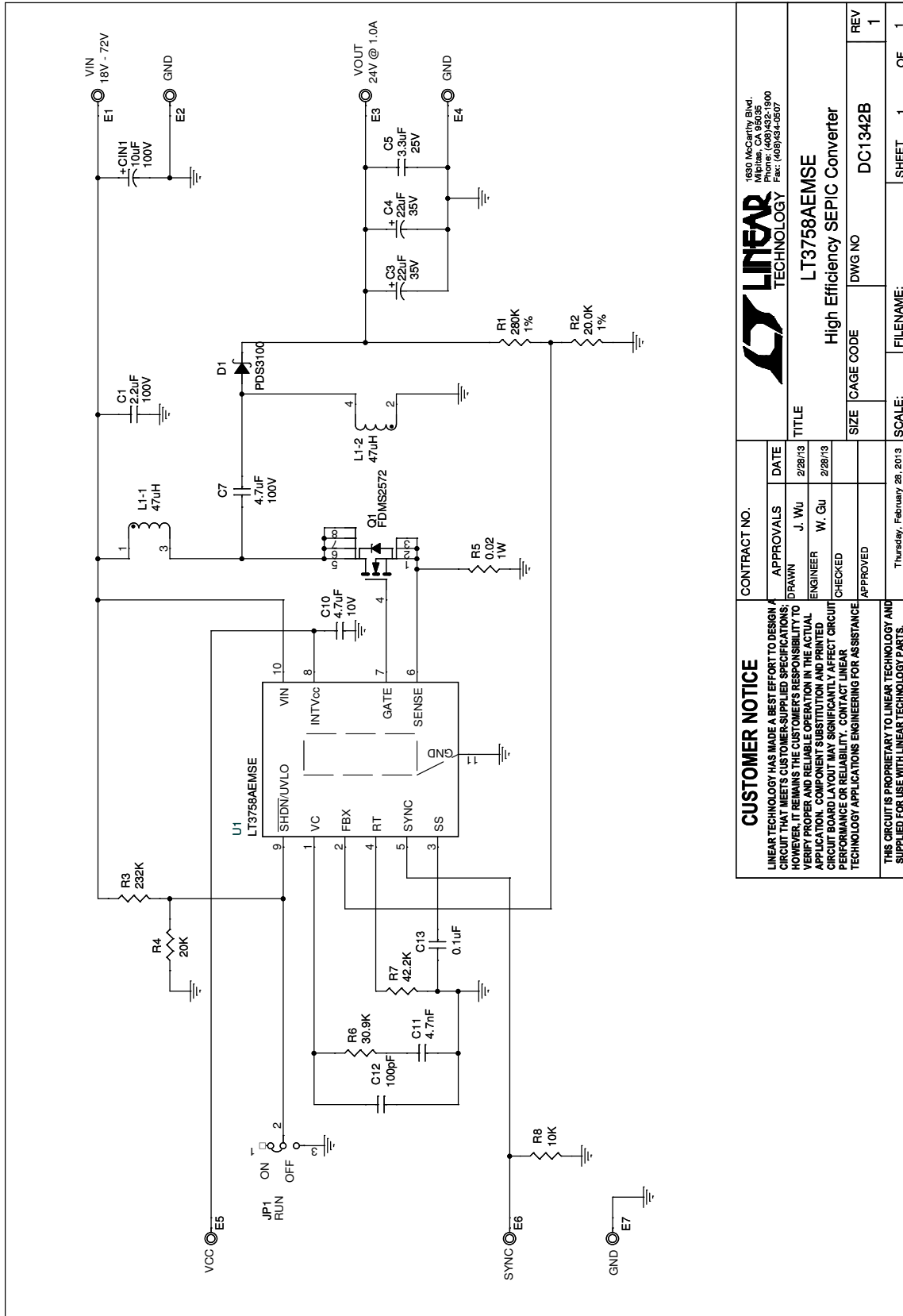
Figure 2. Measuring Input or Output Ripple

# DEMO MANUAL DC1342B

## PARTS LIST

| ITEM  | QTY | REFERENCE                  | PART DESCRIPTION                           | MANUFACTURER/PART NUMBER          |
|---|-----|----------------------------|--|-----------------------------------|
| <b>Required Circuit Components</b>              |     |                            |  |                                   |
| 1   | 1   | C1                         | CAP., X7R, 2.2 $\mu$ F, 100V, 10% 1812     | TDK, C4532X7R2A225K               |
| 2   | 2   | C3, C4                     | CAP., TANT, 22 $\mu$ F, 35V, 20% 7343      | AVX, TPSD226M035R0125             |
| 3   | 1   | C5                         | CAP., X7R, 3.3 $\mu$ F, 25V, 20% 1210      | Taiyo Yuden, TMK325BJ335MN        |
| 4   | 1   | C7                         | CAP., X7R, 4.7 $\mu$ F, 100V, 20% 2220     | TDK, C5750X7R2A475M               |
| 5   | 1   | C10                        | CAP., X5R, 4.7 $\mu$ F, 10V, 20% 0805      | Taiyo Yuden, LMK212BJ475MG-T      |
| 6   | 1   | C11                        | CAP., X7R, 4.7nF, 50V, 10% 0603            | TDK, C1608X7R1H472K               |
| 7   | 1   | C12                        | CAP., COG, 100pF, 50V, 5% 0603             | TDK, C1608COG1H101J               |
| 8   | 1   | C13                        | CAP., X7R, 0.1 $\mu$ F, 25V, 10% 0603      | TDK, C1608X7R1E104K               |
| 9   | 1   | D1                         | Diodes Inc., PDS3100-13                    | Diodes Inc., PDS3100-13           |
| 10  | 1   | L1                         | IND., Dual, 47 $\mu$ H                     | Würth Elektronik, 744870470       |
| 11  | 1   | Q1                         | N-MOSFET, FDMS2572, Power 56               | FAIRCHILD, FDMS2572               |
| 12  | 1   | R1                         | RES., CHIP, 280k, 1/10W, 1% 0603           | VISHAY, CRCW0603280KFKEA          |
| 13  | 2   | R2, R4                     | RES., CHIP, 20.0k, 1/10W, 1% 0603          | VISHAY, CRCW060320K0FKEA          |
| 14  | 1   | R3                         | RES., CHIP, 232k, 1/10W, 1% 0603           | VISHAY, CRCW0603232KFKEA          |
| 15  | 1   | R5                         | RES., CHIP, 0.02, 1W, 1%, 0815             | THIN FILM, RL3720WTR02F-C         |
| 16  | 1   | R6                         | RES., CHIP, 30.9k, 1/10W, 1% 0603          | VISHAY, CRCW060330K9FKEA          |
| 17  | 1   | R7                         | RES., CHIP, 42.2k, 1/10W, 1% 0603          | VISHAY, CRCW060342K2FKEA          |
| 18  | 1   | R8                         | RES., CHIP, 10k, 1/10W, 5% 0603            | VISHAY, CRCW060310K0JNEA          |
| 19  | 1   | U1                         | I.C. LT3758AEMSE, MSOP10/Exposed Pad       | LINEAR TECH., LT3758AEMSE#TRPBF   |
| <b>Additional Demo Board Circuit Components</b> |     |                            |  |                                   |
| 1   | 1   | CIN1                       | CAP., Alum., 10 $\mu$ F, 100V, E Size Code |                                   |
| <b>Hardware: For Demo Board Only</b>            |     |                            |  |                                   |
| 1   | 7   | E1, E2, E3, E4, E5, E6, E7 | TESTPOINT, TURRET, .094" PBF               | MILL-MAX, 2501-2-00-80-00-00-07-0 |
| 2   | 1   | JP1                        | 3 PIN, 0.079 SINGLE ROW HEADER             | SAMTEC, TMM103-02-L-S             |
| 3   | 1   | XJP1                       | SHUNT, .079" CENTER                        | SAMTEC, 2SN-BK-G                  |

**SCHEMATIC DIAGRAM**



|  |           |                  |                             |             |        |
|--|-----------|------------------|-----------------------------|-------------|--------|
| <b>CONTRACT NO.</b>  |           | <b>APPROVALS</b> |                             | <b>DATE</b> |        |
|  |           | DRAWN            | J. WU                       | 2/28/13     |        |
|  |           | ENGINEER         | W. GU                       | 2/28/13     |        |
|  |           | CHECKED          |                             |             |        |
|  |           | APPROVED         |                             |             |        |
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| THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.  |           |                  |                             |             |        |
|  |           | SCALE:           | Thursday, February 28, 2013 | FILENAME:   |        |
| SIZE   | CAGE CODE | DWG NO           | DC1342B                     | SHEET       | 1 OF 1 |
| REV  |           |                  |                             |             | 1      |



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# DEMO MANUAL DC1342B

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

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