DEMO MANUAL DC2242A

LT8494
SEPIC/Boost DC/DC Converter with 2A, 70V Switch, and 7μA Quiescent Current

DESCRIPTION

Demonstration circuit 2242A is a monolithic SEPIC converter featuring LT®8494. The demo board is designed for 5V output from a 3V to 60V input at 450kHz switching frequency. The max output current is 1A when the input voltage is above 12V, and is reduced with lower input voltage. The quiescent current of LT8494 is less than 7μA when operating. Dual supply pins (VIN and BIAS) allow the part to automatically operate from the most efficient supply.

Low ripple Burst Mode® operation increases the efficiency at the light load while keeping the output ripple below 10mV. Figure 1 shows the demo board efficiency at 12V input voltage. Figure 2 shows the maximum load current with different input voltages of the demo board.

The LT8494 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this demo manual for DC2242A. The LT8494 is assembled in 20-lead QFN and 20-lead plastic TSSOP packages. Proper board layout is essential for maximum thermal and electrical performance. See the data sheet sections for details.

Design files for this circuit board are available at http://www.linear.com/demo/DC2242A

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Figure 1. LT8494 Efficiency

Figure 2. LT8494 Maximum Load Current (Typical) vs Input Voltage

PERFORMANCE SUMMARY

Specifications are at TA = 25°C

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>V_IN</td>
<td>Input Supply Range</td>
<td></td>
<td>3</td>
<td>60</td>
<td></td>
<td>V</td>
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<tr>
<td>V_OUT</td>
<td>Output Voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>f_SW</td>
<td>Switching Frequency</td>
<td>R_T = 169kΩ</td>
<td>414</td>
<td>450</td>
<td>477</td>
<td>kHz</td>
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<tr>
<td>I_MAX</td>
<td>Max Output Current</td>
<td>V_IN = 12V</td>
<td>1</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>EFE</td>
<td>Efficiency at DC</td>
<td>V_IN = 12V, I_OUT = 1A</td>
<td>80.3</td>
<td></td>
<td></td>
<td>%</td>
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</tbody>
</table>
QUICK START PROCEDURE

DC2242A is easy to set up to evaluate the performance of the LT8494. Refer to Figure 3 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 VIN or VOUT and GND terminals. See Figure 4 for the proper scope technique.

1. With power off, connect the input power supply to VIN and GND. Make sure that the input voltage does not exceed 60V.

2. With power off, connect loads from VOUT to GND.

3. Turn on the power at the input.

4. Check for the proper output voltages (VOUT = 5V).

   NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high or is shorted.

5. Once the proper output voltage is established, adjust the load within the operating ranges and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
QUICK START PROCEDURE

Figure 3. Proper Measurement Equipment Setup

Figure 4. Measuring Input or Output Ripple
## Parts List

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>REFERENCE</th>
<th>Part Description</th>
<th>Manufacturer/Part Number</th>
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<tbody>
<tr>
<td><strong>Required Circuit Components</strong></td>
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<tr>
<td>1</td>
<td>2</td>
<td>C2, C8</td>
<td>CAP., X7R, 2.2µF, 100V, 10%, 1210</td>
<td>MURATA, GRM32ER72A225KA35L</td>
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<td>2</td>
<td>2</td>
<td>C3, C4</td>
<td>CAP., X7R, 47µF, 10V, 10%, 1210</td>
<td>MURATA, GRM32ER71A476KE15L</td>
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<td>3</td>
<td>2</td>
<td>C5, C7</td>
<td>CAP., X7R, 1µF, 10V, 10%, 0603</td>
<td>MURATA, GRM188R71A105KA61D</td>
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<td>4</td>
<td>1</td>
<td>C6</td>
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<td>5</td>
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<td>DIODE, SCHOTTKY 100V, 2A, SMA</td>
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<td>6</td>
<td>1</td>
<td>L1</td>
<td>INDUCTOR, 15µH</td>
<td>VISHAY, IHCL4040DZER150M5A</td>
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<td>VISHAY, CRCW06031M00FKEA</td>
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<td>8</td>
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<td>VISHAY, CRCW0603100KFEA</td>
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<tr>
<td>10</td>
<td>1</td>
<td>R6</td>
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<td>VISHAY, CRCW0603169KFKEA</td>
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<td>11</td>
<td>1</td>
<td>R9</td>
<td>RES., CHIP, 0, 1/10W, 0603</td>
<td>VISHAY, CRCW06030000Z0EA</td>
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<tr>
<td>12</td>
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<td>U1</td>
<td>I.C., LT8494, TSSOP-20-4.4mm</td>
<td>LINEAR TECH., LT8494EFE#PBF</td>
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<td><strong>Additional Demo Board Circuit Components</strong></td>
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<td>1</td>
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<td>CAP., ALUM, 10µF, 63V, 20%</td>
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<td>CAP., OPTION, 0603</td>
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<tr>
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<td>RES., OPTION, 0603</td>
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<td><strong>Hardware: For Demo Board Only</strong></td>
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<td>E1-E6</td>
<td>TESTPOINT, TURRET, .094&quot; PBF</td>
<td>MILL-MAX, 2501-2-00-80-00-00-07-0</td>
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SCHEMATIC DIAGRAM

1. The max load current is reduced when the input voltage is less than 12V. Please see demo manual for details.

2. All capacitors are in microfarads, 0603.

3. All resistors are in ohms, 0603.

4. Vin: 3V - 60V

5. Vout: 5V / 1A

6. C1: 680uF, 12V

7. C2: 2.2uF, 1210, 10V

8. C3: 100uF, 63V

9. C4: 47uF, 1210, 10V

10. C5: 1uF, 0603

11. R1: 1M

12. R2: 1.69K

13. R3: 680K

14. R4: 2.7K

15. R5: 316K

16. L1: 15uH

17. D1: MBRA300H100T3G

18. U1: LT8494EFE

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NOTES:

1. All resistors are in ohms, 0603.

2. All capacitors are in microfarads, 0603.

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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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