

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 803

## 2-PHASE DUAL SYNCHRONOUS STEP-DOWN CONVERTER WITH SPREAD SPECTRUM AND OUTPUT TRACKING

### LTC3736EUF-1

## DESCRIPTION

Demonstration circuit 803 is a high efficiency 2-phase dual synchronous step-down DC/DC converter with 2.75V to 8V input range. It has two outputs: 2.5V (5A maximum at 5V input) and 1.8V (5A maximum at 5V input). The demo circuit features the LTC®3736EUF-1 controller. The constant frequency current mode architecture with MOSFET  $V_{DS}$  sensing eliminates the need for sense resistors and improves efficiency. Out of phase operation significantly reduces input ripple current as well as the input capacitor size.

Switching frequency is internally set at 550kHz. The frequency can also be adjusted using FREQ pin (with spread spectrum operation disabled). Tying FREQ pin

to GND selects 300kHz operation; tying FREQ pin to VIN selects 750kHz operation.

The demo board can be selected to operate in spread spectrum mode (JP1: Enable) with significantly reduced peak switching noise. The board has tracking function too, allowing  $V_{OUT2}$  to track  $V_{OUT1}$  during start-up.

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

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**Table 1. Performance Summary ( $T_A = 25^\circ\text{C}$ )**

| PARAMETER                               | CONDITION                                                                                                          | VALUE               |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------|
| Input Voltage Range                     |                                                                                                                    | 2.75V to 8V         |
| $V_{OUT1}$                              | $V_{IN} = 2.75\text{--}8\text{V}$ , $I_{OUT1} = 0\text{A to } 5\text{A}$ ,<br>$I_{OUT2} = 0\text{A to } 5\text{A}$ | 2.5V $\pm 3\%$      |
| $V_{OUT2}$                              | $V_{IN} = 2.75\text{--}8\text{V}$ , $I_{OUT1} = 0\text{A to } 5\text{A}$ ,<br>$I_{OUT2} = 0\text{A to } 5\text{A}$ | 1.8V $\pm 3\%$      |
| Typical Output Ripple $V_{OUT1}$        | $V_{IN} = 3.3\text{V}$ , $I_{OUT1} = 3\text{A}$ (20MHz BW)                                                         | 20mV <sub>P-P</sub> |
| Typical Output Ripple $V_{OUT2}$        | $V_{IN} = 3.3\text{V}$ , $I_{OUT2} = 3\text{A}$ (20MHz BW)                                                         | 14mV <sub>P-P</sub> |
| Typical Switching Frequency             | FREQ Pin Floating; Spread Spectrum: Disable                                                                        | 550kHz              |
| Typical Spread Spectrum Frequency Range | Spread Spectrum: Enable                                                                                            | 450kHz- 580kHz      |

## QUICK START PROCEDURE

Demonstration circuit 803 is easy to set up to evaluate the performance of LTC3736-1. 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. (it's recommended to

measure the output ripple directly at the main output capacitor).

1. With power off, connect the input power supply to +Vin (2.75V-8V) and GND (input return).
2. Connect the 2.5V load (Load 1 in Figure 1) between Vout1 and GND; connect the 1.8V load (Load 2 in

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- Figure 1) between Vout2 and GND. (Initial loads: 0A)
3. Connect the DVMs to the input and outputs.
  4. Turn on the input power supply and check for the proper output voltages. Vout1 should be 2.5V+/-3%. Vout2 should be 1.8V+/-3%.
  5. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage and other parameters.

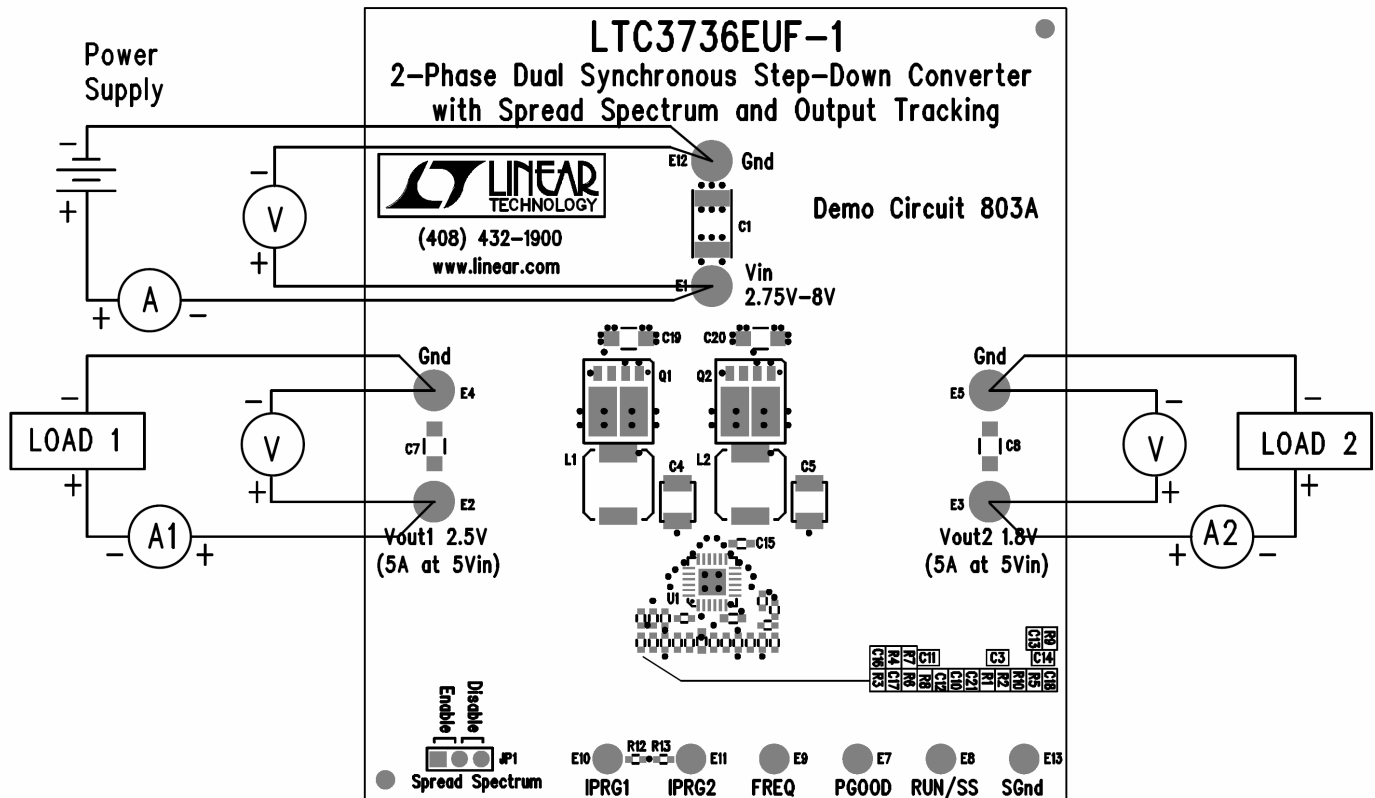
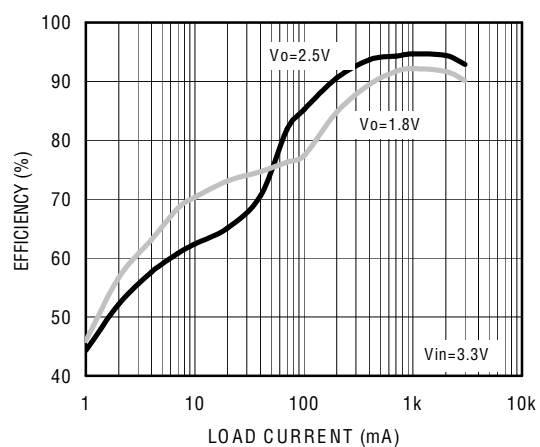


Figure 1. Proper Measurement Equipment Setup

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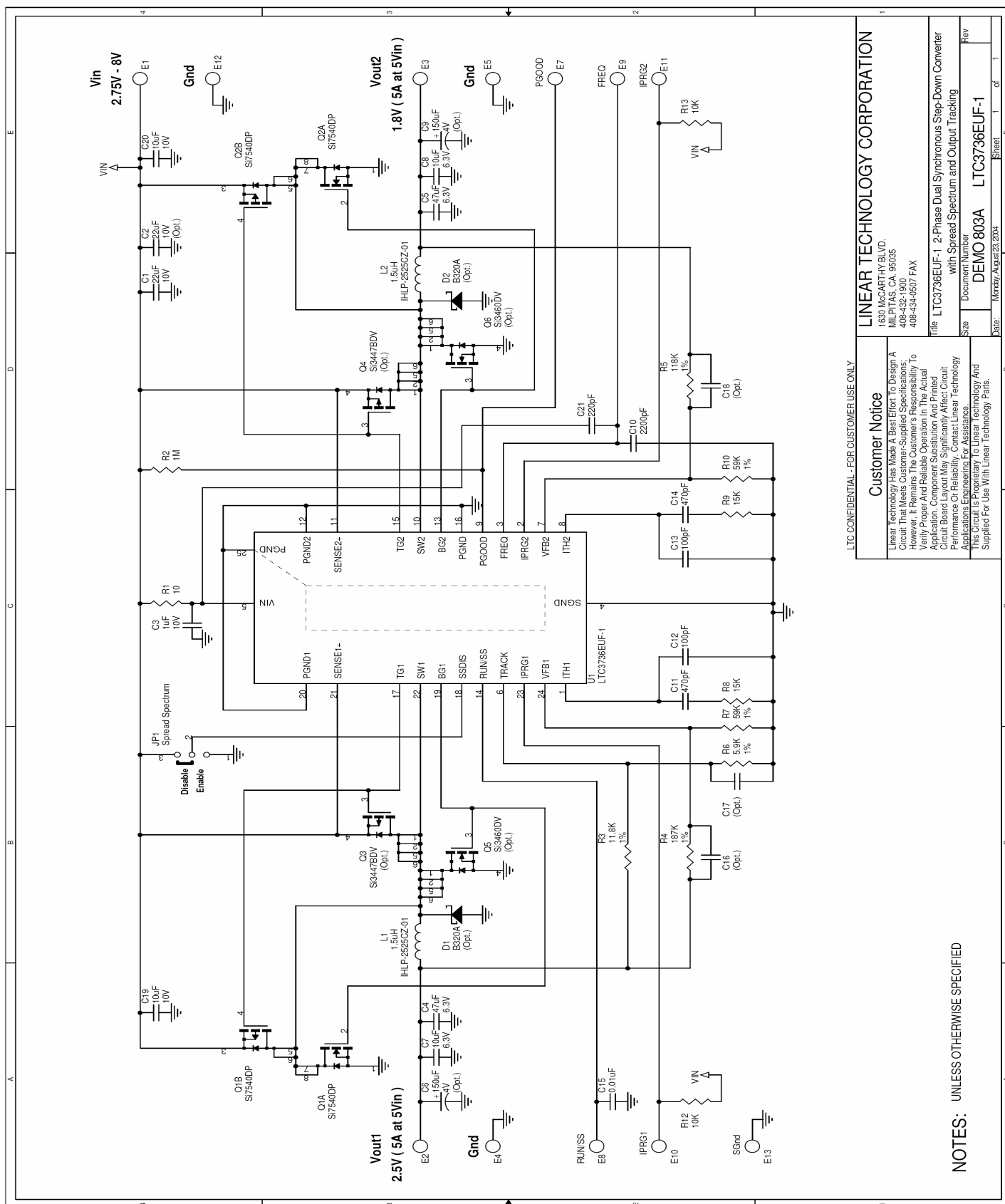
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**Figure 2. Efficiency vs load current (550kHz)**

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DEMO 803A LTC3736EUF-1  
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### 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. Please Contact Our Linear Technology Applications Engineering For Assistance. This Circuit Is Proprietary To Linear Technology And Supplied For Use With Linear Technology Parts.

NOTES: UNLESS OTHERWISE SPECIFIED