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.

Table 1. Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Input Voltage Range		2.75V to 8V
V_{OUT1}	V_{IN} = 2.75-8V, I_{OUT1} = 0A to 5A, I_{OUT2} = 0A to 5A	2.5V ±3%
V_{OUT2}	V_{IN} = 2.75-8V, I_{OUT1} = 0A to 5A, I_{OUT2} = 0A to 5A	1.8V ±3%
Typical Output Ripple V_{OUT1}	V_{IN} = 3.3V, I_{OUT1} = 3A (20MHz BW)	$20mV_{P-P}$
Typical Output Ripple V_{OUT2}	V_{IN} = 3.3V, I_{OUT2} = 3A (20MHz BW)	$14mV_{P-P}$
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

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.

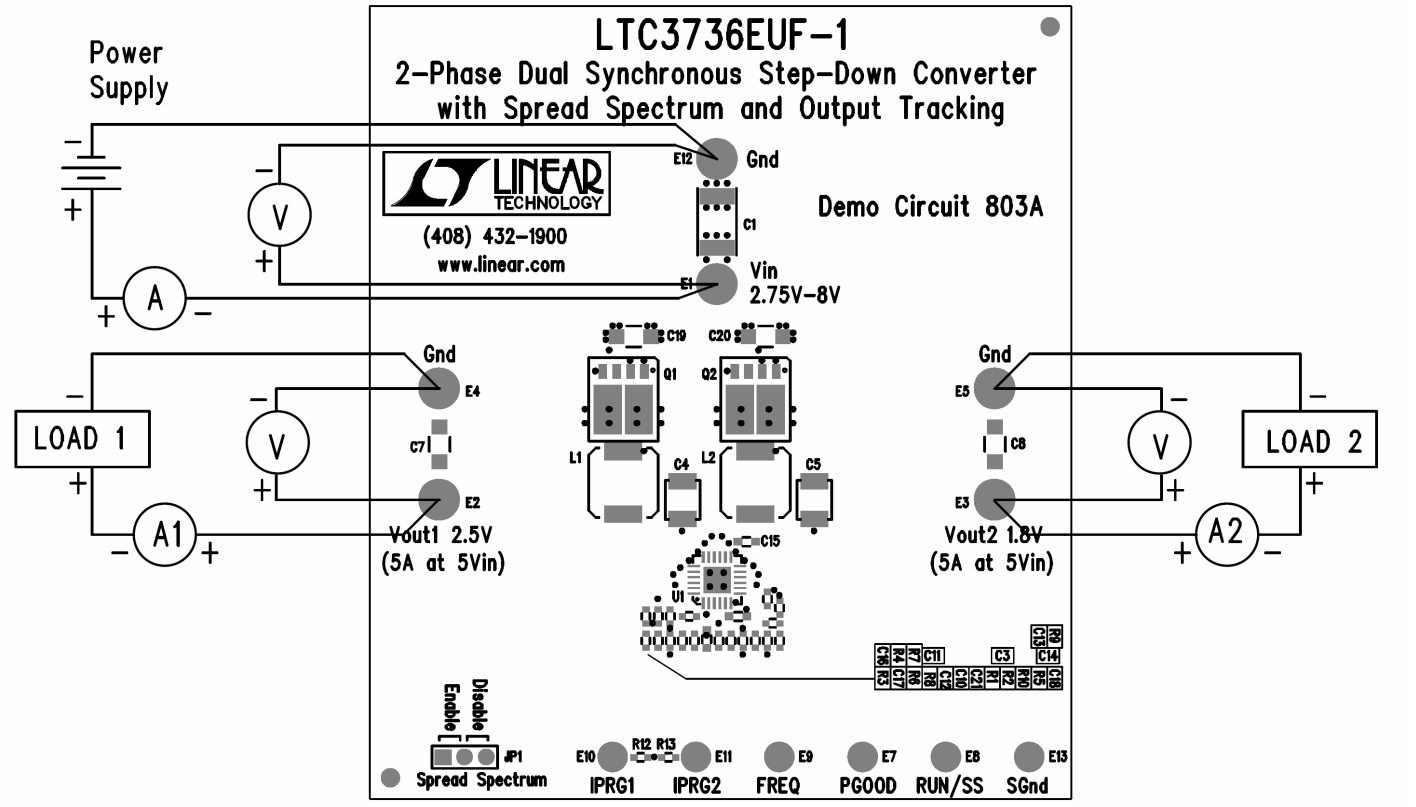


Figure 1. Proper Measurement Equipment Setup

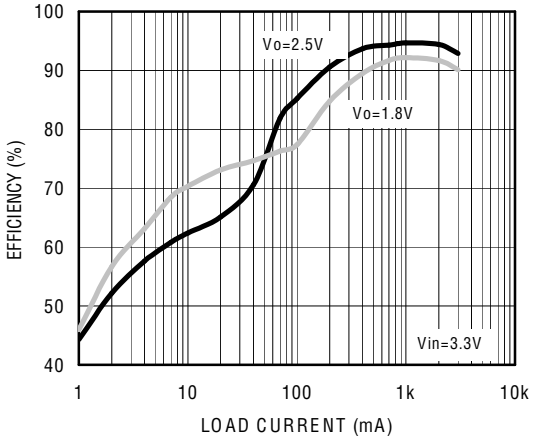
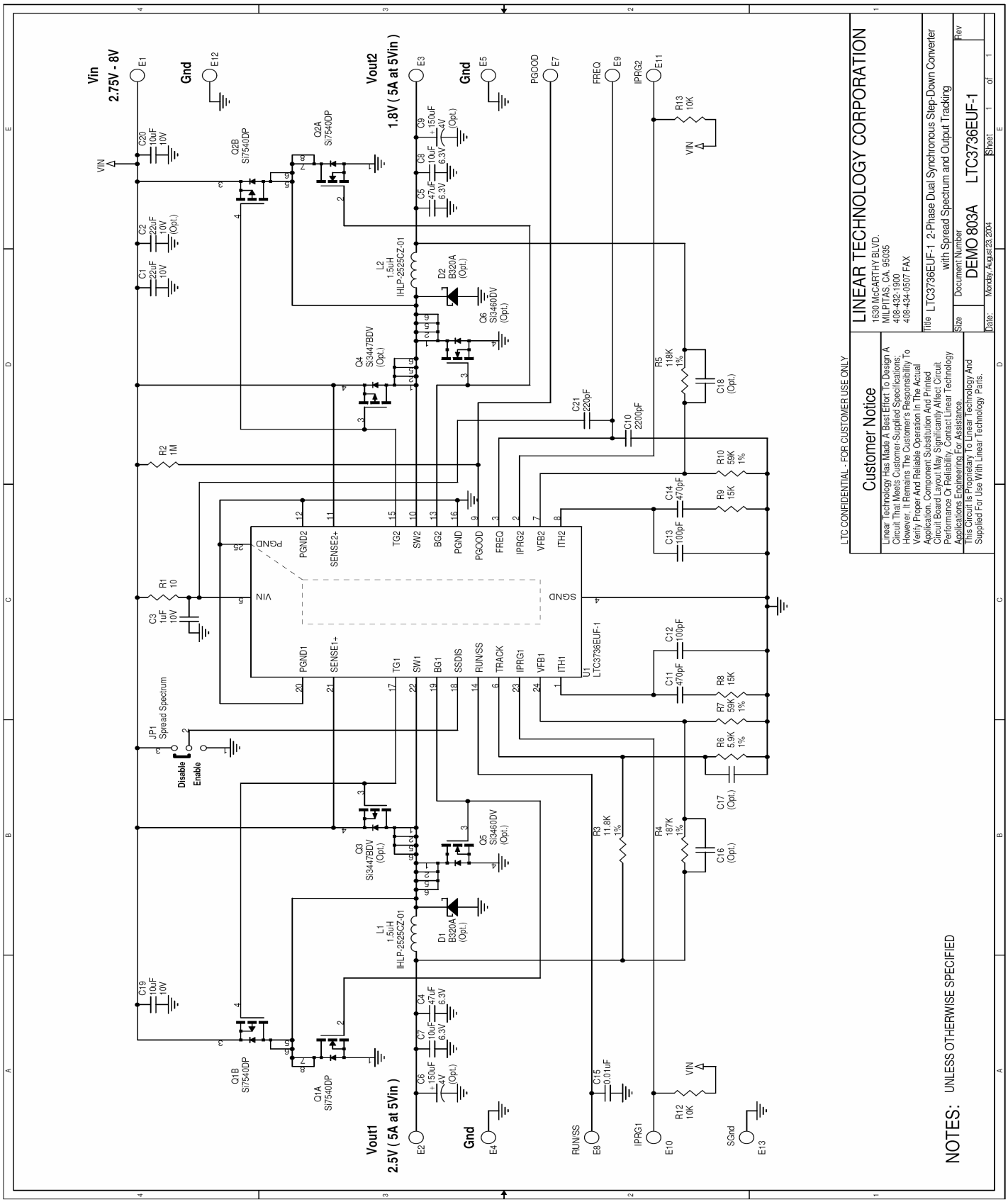


Figure 2. Efficiency vs load current (550kHz)


Vin
2.75V - 8V
Vout2
1.8V (5A at 5Vin)
Vout1
2.5V (5A at 5Vin)
Gnd
PGOOD
FREQ
IPRG2
RUN/SS
IPRG1
SGnd
VIN
U1
LTC3736EUF-1
PGND1
SENSE1+
TG1
SW1
BG1
SSDIS
RUN/SS
TRACK
IPRG1
VFB1
ITH1
PGND2
SENSE2+
TG2
SW2
BG2
PGND
PGOOD
FREQ
IPRG2
VFB2
ITH2
SGND
JP1
Spread Spectrum
Disable
Enable
L1
1.5uH
IHLP-2525CZ-01
L2
1.5uH
IHLP-2525CZ-01
D1
B320A
(Opt.)
D2
B320A
(Opt.)
Q1A
Si7540DP
Q1B
Si7540DP
Q2A
Si7540DP
Q2B
Si7540DP
Q3
Si3447BDV
(Opt.)
Q4
Si3447BDV
(Opt.)
Q5
Si3460DV
(Opt.)
Q6
Si3460DV
(Opt.)
R1 10
R2 1M
R3 11.8K 1%
R4 187K 1%
R5 118K 1%
R6 5.9K 1%
R7 59K 1%
R8 15K
R9 15K
R10 59K 1%
R12 10K
R13 10K
C1 22uF 10V
C2 22uF 10V (Opt.)
C3 1uF 10V
C4 47uF 6.3V
C5 47uF 6.3V
C6 150uF 4V (Opt.)
C7 10uF 6.3V (Opt.)
C8 10uF 6.3V
C9 150uF 4V (Opt.)
C10 2200pF
C11 470pF
C12 100pF
C13 100pF
C14 470pF
C15 0.01uF
C16 (Opt.)
C17 (Opt.)
C18 (Opt.)
C19 10uF 10V
C20 10uF 10V
C21 220pF
E1
E2
E3
E4
E5
E7
E8
E9
E10
E11
E12
E13
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NOTES: UNLESS OTHERWISE SPECIFIED