DESCRIPTION

Demonstration circuit 836 is a No R_{SENSE}™ constant frequency step-down DC/DC converter featuring the LTC3772 Controller in a 3mm×2mm DFN package. The demo board generates 2A output current at one of the three output voltages: 1.8V, 2.5V or 3.3V. The output voltage is selectable by JP1. Higher output current is made possible using optional components. The exclusive use of surface mount components results in a highly efficient application in a very small board space. The demo board highlights the capabilities of the LTC3772, which uses current mode architecture to drive an external P-channel power MOSFET. This results in fast loop dynamics and transient response. The ON resistance of the MOSFET is used to sense the switch current. No additional sense resistor is needed. The LTC3772's internal soft-start reduces the maximum input current during start up. To maximize the runtime from a battery source, the MOSFET is turned on continuously in dropout (100% duty cycle). The peak current sense voltage can be configured into three different voltage thresholds for different loads. The LTC3772 enters Burst Mode™ at light loads, enhancing the efficiency in this mode. If the output is shorted to ground, the frequency is folded back to prevent current runaway. High efficiency over wide load conditions and compact size make the LTC3772 ideal for portable applications.

The LTC3772 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for demo circuit 836.

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

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
I_Q	Input DC Current in Shutdown Mode	$V_{ITH/RUN}$ = 0V, V_{IN} = 4.2V		8	20	uA
V_{IN}	Input Voltage	V_{OUT} = 1.8V	2.75		8*	V
		VOUT = 2.5V	3		8*	
		VOUT = 3.3V	3.5		8*	
V_{OUT}	Output Voltage	I_{LOAD} = 2A, JP1 on 1.8V position	1.728	1.8	1.872	V
		I_{LOAD} = 2A, JP1 on 2.5V position	2.4	2.5	2.6	
		I_{LOAD} = 2A, JP1 on 3.3V position	3.168	3.3	3.432	
I_{OUT}	Output Current				2	A
EFF	Efficiency	V_{IN} = 3V, V_{OUT} = 1.8V, I_{OUT} = 2A		86%		
		V_{IN} = 3V, V_{OUT} = 2.5V, I_{OUT} = 2A		92%		
		V_{IN} = 4V, V_{OUT} = 3.3V, I_{OUT} = 2A		94%		
VPP	OUTPUT VOLTAGE RIPPLE	V_{IN} = 8V, V_{OUT} = 3.3V, I_{OUT} = 2A		22		mV

*: The maximum V_{IN} is limited by the MOSFET gate voltage. The maximum V_{IN} of LTC3772 is rated at 9.8V.

QUICK START PROCEDURE

Demonstration circuit 836 is easy to set up to evaluate the performance of the LTC3772. 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 jumpers in the following positions:

   JP1 One of three positions (1.8V, 2.5V or 3.3V)

2. With power off, connect the input power supply to V_{IN} and GND and the load to V_{OUT} and GND.

3. Turn on the power at the input.

   NOTE: Make sure that the input voltage does not exceed 8V.

4. Check for the proper output voltages per the JP1 setup.

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

5. 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.

6. To evaluate output current higher than 2A, the footprints on the bottom side of the board can be used. Refer to the datasheet for more application examples.

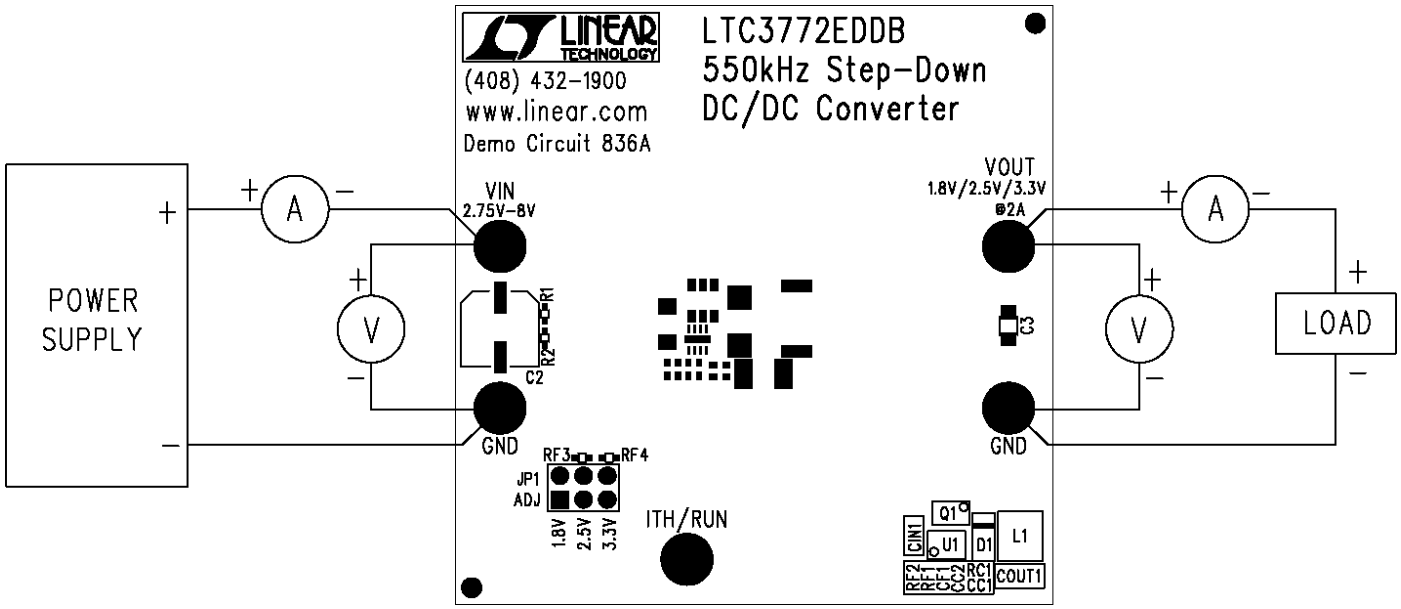


Figure 1. Proper Measurement Equipment Setup

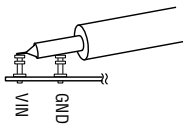
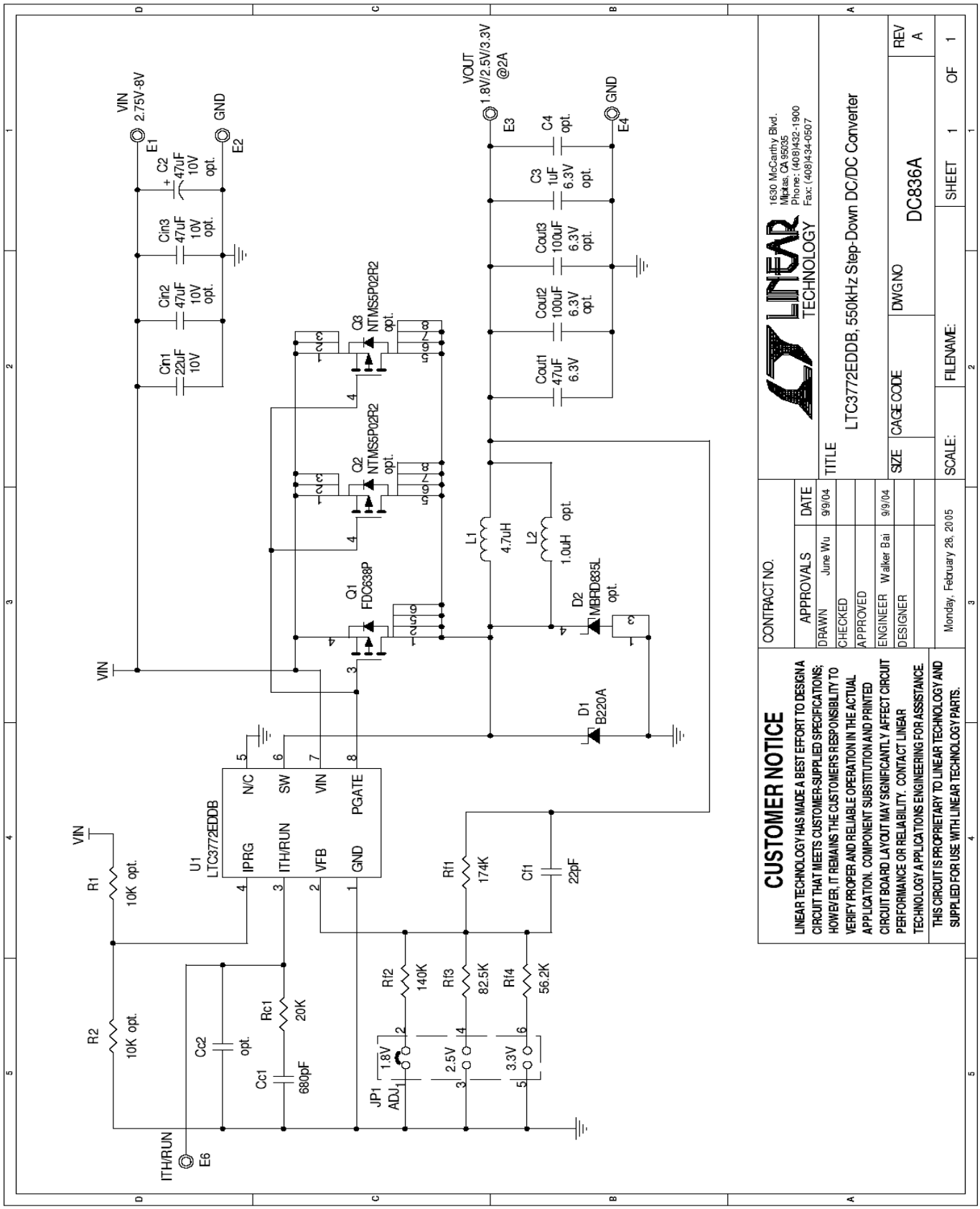


Figure 2. Measuring Input or Output Ripple


VIN
2.75V-8V
E1
GND
E2
C2
47uF
10V
opt.
Cin3
47uF
10V
opt.
Cin2
47uF
10V
opt.
Cin1
22uF
10V
VOUT
1.8V/2.5V/3.3V
@2A
E3
GND
E4
C4
opt.
C3
1uF
6.3V
opt.
Cout3
100uF
6.3V
opt.
Cout2
100uF
6.3V
opt.
Cout1
47uF
6.3V
Q3
NTMSSP02R2
opt.
Q2
NTMSSP02R2
opt.
Q1
FDC638P
L1
4.7uH
L2
1.0uH opt.
D2
MBRD835L
opt.
D1
B220A
VIN
U1
LTC3772EDDB
N/C
SW
VIN
PGATE
IPRG
ITH/RUN
VFB
GND
R1
10K opt.
R2
10K opt.
Cc2
opt.
Cc1
680pF
Rc1
20K
Rf1
174K
Cf1
22pF
Rf2
140K
Rf3
82.5K
Rf4
56.2K
JP1
1.8V
2.5V
3.3V
ADJ
ITH/RUN
E6
CUSTOMER NOTICE
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THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
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APPROVED
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DESIGNER
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TITLE
LTC3772EDDB, 550kHz Step-Down DC/DC Converter
SIZE
CAGE CODE
DWG NO
DC836A
REV
A
FILENAME:
SHEET 1 OF 1