DEMO CIRCUIT 924
QUICK START GUIDE

LTC3772B
No Rsense Constant Frequency Step-Down DC/DC Controller in 3x2 DFN

DESCRIPTION

Demonstration circuit 924 is a No R_{SENSE}™ constant frequency step-down DC/DC converter featuring the LTC3772B Controller in a 3mm×2mm DFN package. The demo circuit 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 circuit highlights the capabilities of the LTC3772B, 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 LTC3772B's internal soft-start reduces the inrush 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. If the output is shorted to ground, the frequency is folded back to prevent current runaway. 550KHz constant frequency operation makes the LTC3772B ideal for low noise applications.

The LTC3772B 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 924.

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	3		8*	V
		VOUT = 2.5V	3.3		8*	
		VOUT = 3.3V	3.9		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	
IOUT(MAX)	Maximum 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		91%		
		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
F	Oscillator Frequency	V_{FB} = 0.8V	500	550	650	KHz

*: The maximum V_{IN} is limited by the MOSFET gate voltage. The maximum V_{IN} of LTC3772B is rated at 9.8V.

QUICK START PROCEDURE

Demonstration circuit 924 is easy to set up to evaluate the performance of the LTC3772B. 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.

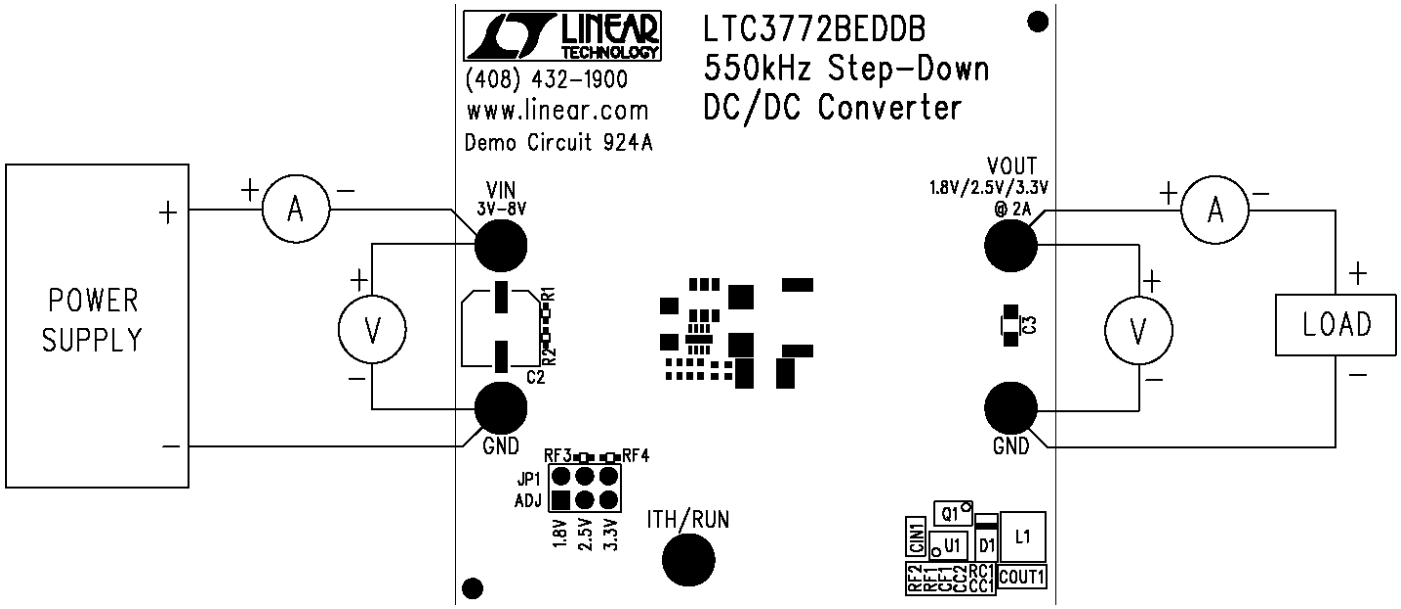


Figure 1. Proper Measurement Equipment Setup

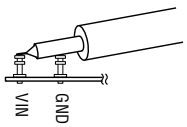
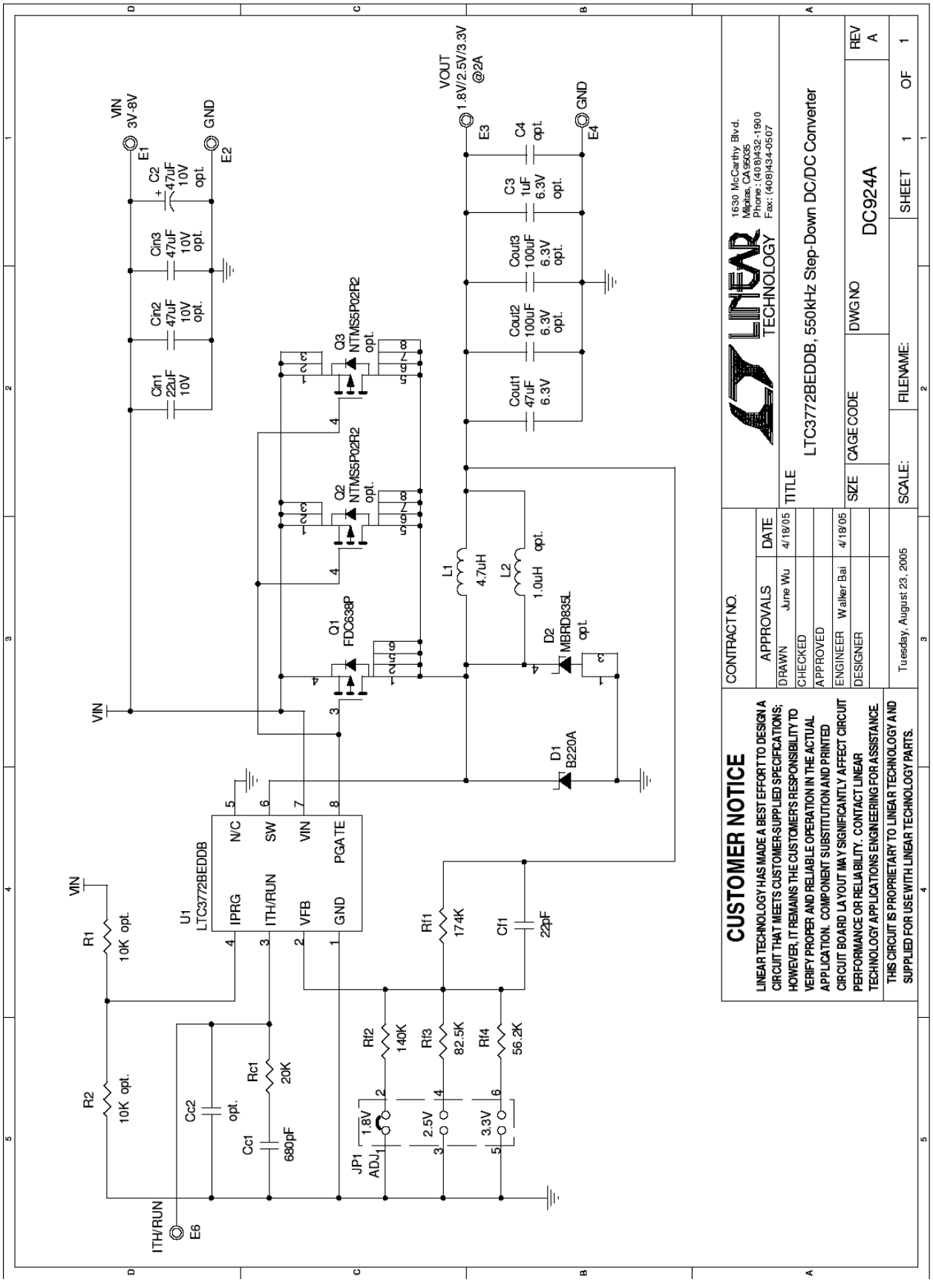


Figure 2. Measuring Input or Output Ripple


VIN
3V-8V
E1
GND
E2
VOUT
1.8V/2.5V/3.3V
@2A
E3
GND
E4
ITH/RUN
E6
U1
LTC3772BEDDB
IPRG
ITH/RUN
VFB
GND
N/C
SW
VIN
PGATE
R1
10K opt.
R2
10K opt.
Rc1
20K
Cc1
680pF
Cc2
opt.
JP1
1.8V
2.5V
3.3V
ADJ
Rf1
174K
Rf2
140K
Rf3
82.5K
Rf4
56.2K
Cf1
22pF
Cin1
22uF
10V
Cin2
47uF
10V
opt.
Cin3
47uF
10V
opt.
C2
47uF
10V
opt.
Cout1
47uF
6.3V
Cout2
100uF
6.3V
opt.
Cout3
100uF
6.3V
opt.
C3
1uF
6.3V
opt.
C4
opt.
Q1
FDC638P
Q2
NTMSP02R2
opt.
Q3
NTMSP02R2
opt.
L1
4.7uH
L2
1.0uH opt.
D1
B220A
D2
MBRD835L
opt.
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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 OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.
THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
CONTRACT NO.
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TITLE
LTC3772BEDDB, 550kHz Step-Down DC/DC Converter
SIZE
CAGE CODE
DWG NO
DC924A
REV
A
SCALE:
FILENAME:
SHEET 1 OF 1