DESCRIPTION

Demonstration circuit 623 is a step-down (buck) regulator, using the LTC®3801 monolithic controller. The DC623 has an input voltage range of 2.5V to 9.8V and is capable of providing 1A at an output voltage of 2.5V from a single Li-Ion cell. The DC623 highlights the capabilities of the LTC3801, a constant frequency step-down DC-to-DC controller that comes in a tiny SOT-23 package and runs off extremely low quiescent currents. The LTC3801 uses a current mode PWM architecture to drive an external P-channel power MOSFET in a buck regulator application. The result is a high performance power supply that is ideal for cell phones and other portable electronics operating from one or two Li-ion cell. Due to the use of surface mount components, the DC623 is a highly efficient power supply for use in very small spaces.

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

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

PARAMETER		CONDITION	VALUE
Minimum Input Voltage			2.5V
Maximum Input Voltage			9.8V
Output Voltage		V_{IN} = 2.5V to 9.8V, I_{OUT} = 0A to 1A	2.5V ±5%
Typical Output Ripple		V_{IN} = 4.2V, I_{OUT} = 600mA (20MHz BW)	100mV_{P-P}
Typical Supply Current	Normal	V_{IN} = 4.2V	195
	Sleep	V_{IN} = 4.2V	16
	Shutdown	V_{IN} = 4.2V, Ith/Run=0V	5
Maximum Output Current		V_{IN} = 4.2V, V_{OUT} = 2.5V	1A (min)
Typical Load Regulation		V_{IN} = 4.2V, 100mA ≤ I_{OUT} ≤ 1A	1%

QUICK START PROCEDURE

Demonstration circuit 623 is easy to set up to evaluate the performance of the LTC3801. 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. Turn on the input power supply, set to 5V, with no load on the output. Measure V_{OUT}; it should be 2.5V ±3% (2.425V to 2.575V).
2. Vary the load current from no load to 1A. The output voltage should be within a tolerance of ±4% (2.4V and 2.6V).
3. Vary the input voltage from 2.7V to 9.8V. The output voltage should be within ±5% tolerance (2.375V and 2.625V).

4. With the load current at 1A, measure the output ripple voltage; it should measure less than 100 mVAC.

5. Observe the voltage waveform at the switch node (pin); the switching frequency should be between 500kHz and 650kHz (T = 2 us and 1.5 us).

6. To shut down the circuit, connect the RUN turret to ground (GND).

When finished, disconnect the power.

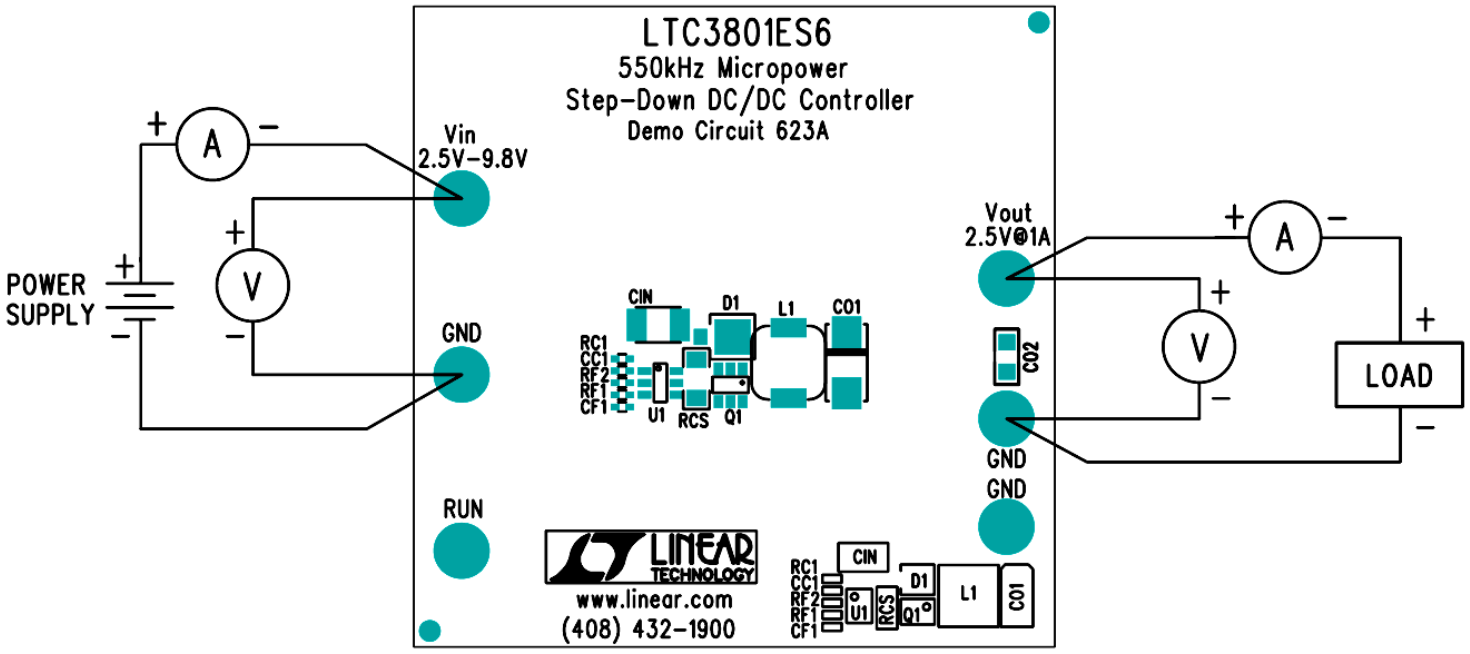


Figure 1. Proper Measurement Equipment Setup

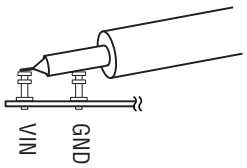
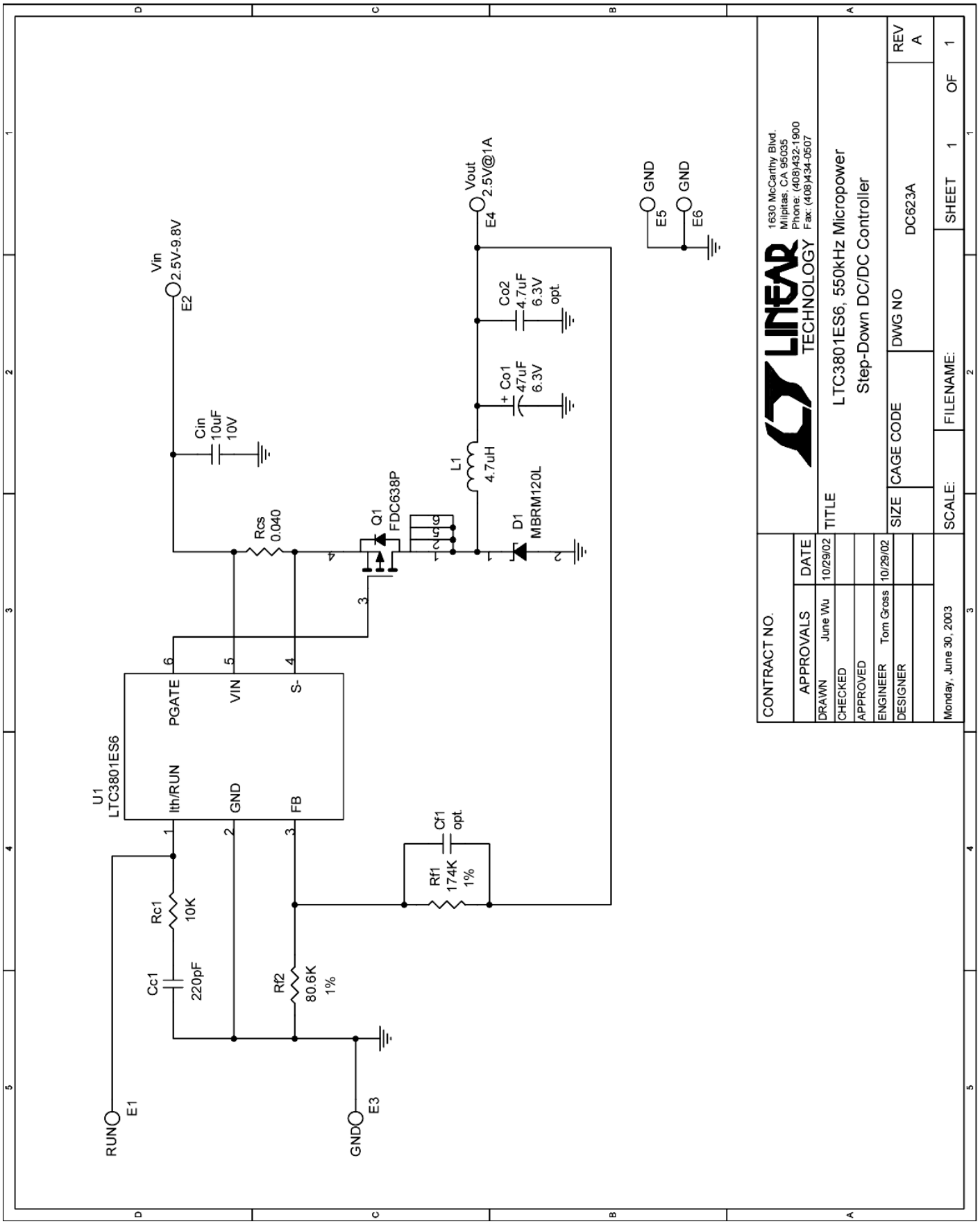


Figure 2. Measuring Input or Output Ripple


Vin
2.5V-9.8V
E2
Cin
10uF
10V
Rcs
0.040
Q1
FDC638P
L1
4.7uH
D1
MBRM120L
Vout
2.5V@1A
E4
Co2
4.7uF
6.3V
opt.
+ Co1
47uF
6.3V
GND
E5
GND
E6
U1
LTC3801ES6
PGATE
VIN
S-
Ith/RUN
GND
FB
Rc1
10K
Cc1
220pF
Rf2
80.6K
1%
Cf1
opt.
Rf1
174K
1%
RUN
E1
GND
E3
CONTRACT NO.
APPROVALS
DATE
DRAWN June Wu 10/29/02
CHECKED
APPROVED
ENGINEER Tom Gross 10/29/02
DESIGNER
Monday, June 30, 2003
TITLE
LTC3801ES6, 550kHz Micropower
Step-Down DC/DC Controller
SIZE
CAGE CODE
DWG NO
DC623A
REV
A
SCALE:
FILENAME:
SHEET 1 OF 1
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
LINEAR TECHNOLOGY