

## 42V, 750mA Step-Down Regulator with 2.5 $\mu$ A Quiescent Current

### DESCRIPTION

Demonstration circuit 1730A features the LT3973, a monolithic step-down switching regulator which consumes only 2.5 $\mu$ A quiescent current. The demo circuit is designed for a 5V, 750mA output from a 5.6V to 42V input. The wide input range of the LT3973 allows a variety of input sources including automotive batteries and 24V industrial supplies. In order to reduce the number of components and solution size, the catch diode and boost diode are integrated. The switching frequency is adjustable up to 2.2MHz. At light loads, the regulator operates in Burst Mode<sup>®</sup> to maintain high efficiency and low output ripple.

The current mode control scheme creates fast transient response and good loop stability. During short circuit and

overvoltage conditions, the catch diode current is limited to protect the part. Users can populate R7 and R8 on the EN/UVLO pin to provide a programmable undervoltage lockout. In addition, the shutdown feature can be utilized by placing jumper JP1 in the OFF position.

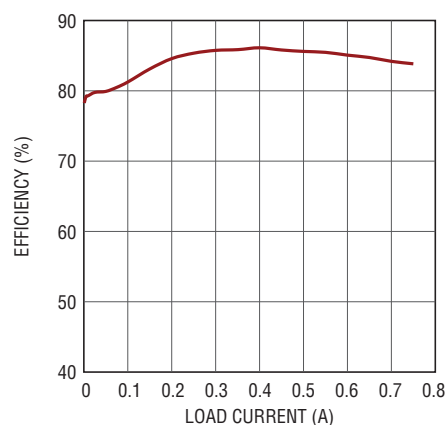
The LT3973 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 1730A.

**Design files for this circuit board are available at <http://www.linear.com/demo>**

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### PERFORMANCE SUMMARY (T<sub>A</sub> = 25°C)

PARAMETER	CONDITIONS	VALUE
Minimum Input Voltage		5.6V
Maximum Input Voltage		42V
Output Voltage		5.04V $\pm$ 3%
Maximum Output Current		750mA
Typical Switching Frequency		600kHz
Typical Efficiency	V <sub>IN</sub> = 12V, I <sub>OUT</sub> = 750mA	84%



dc1730af F01

Figure 1. DC1730A Efficiency: V<sub>IN</sub> = 12V, V<sub>OUT</sub> = 5V, 600kHz

dc1730af

## QUICK START PROCEDURE

Demonstration circuit 1730A is easy to set up to evaluate the performance of the LT3973. Refer to Figure 2 for proper measurement equipment setup and follow the procedure below:

1. Place Jumper JP1 in the ON position.
2. With power off, connect the input power supply to VIN and GND.
3. With power off, connect load from VOUT to GND.
4. Turn on the power at the input.

**NOTE.** Make sure that the input voltage does not exceed 42V.

5. Check for the proper output voltage.

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

6. 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.

**QUICK START PROCEDURE**

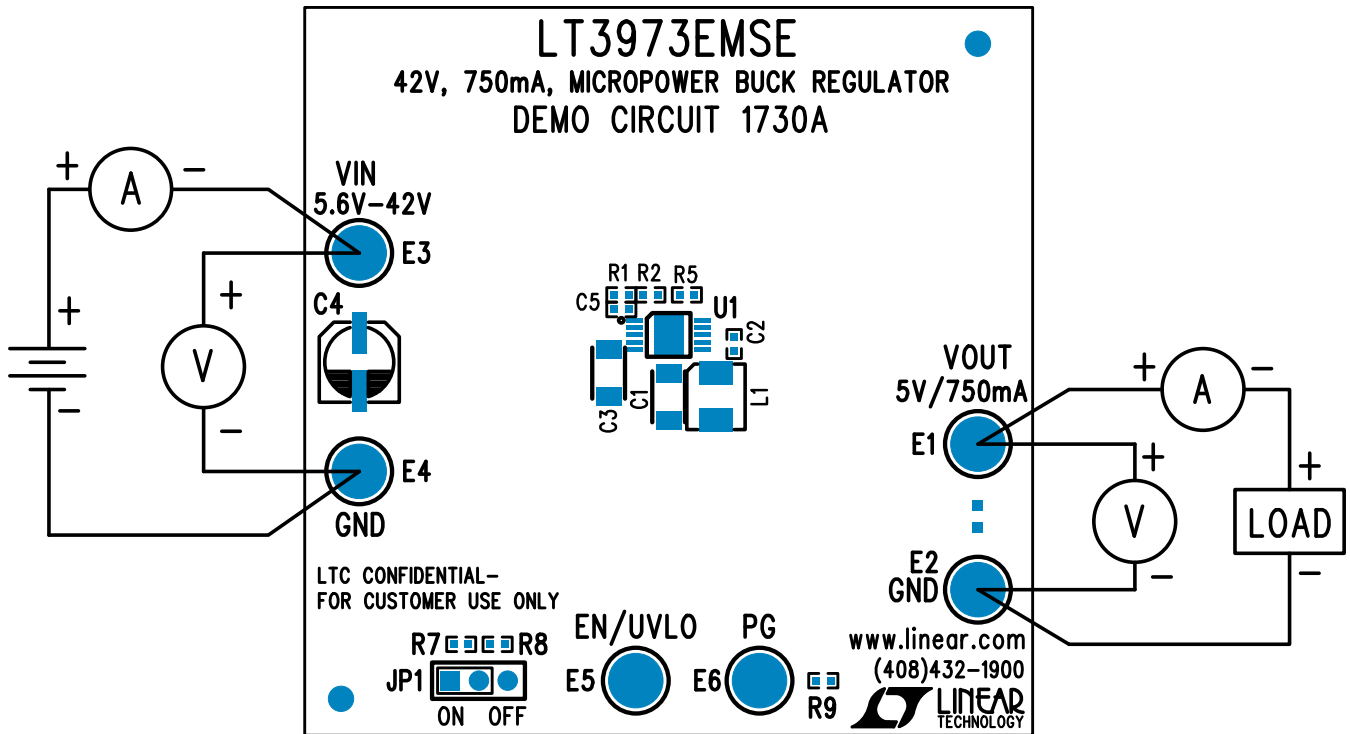


Figure 2. DC1730A Proper Measurement Equipment Setup

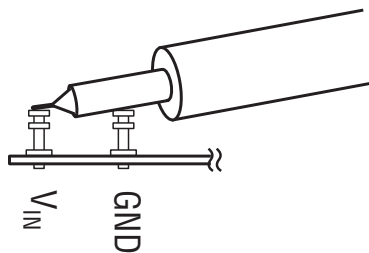


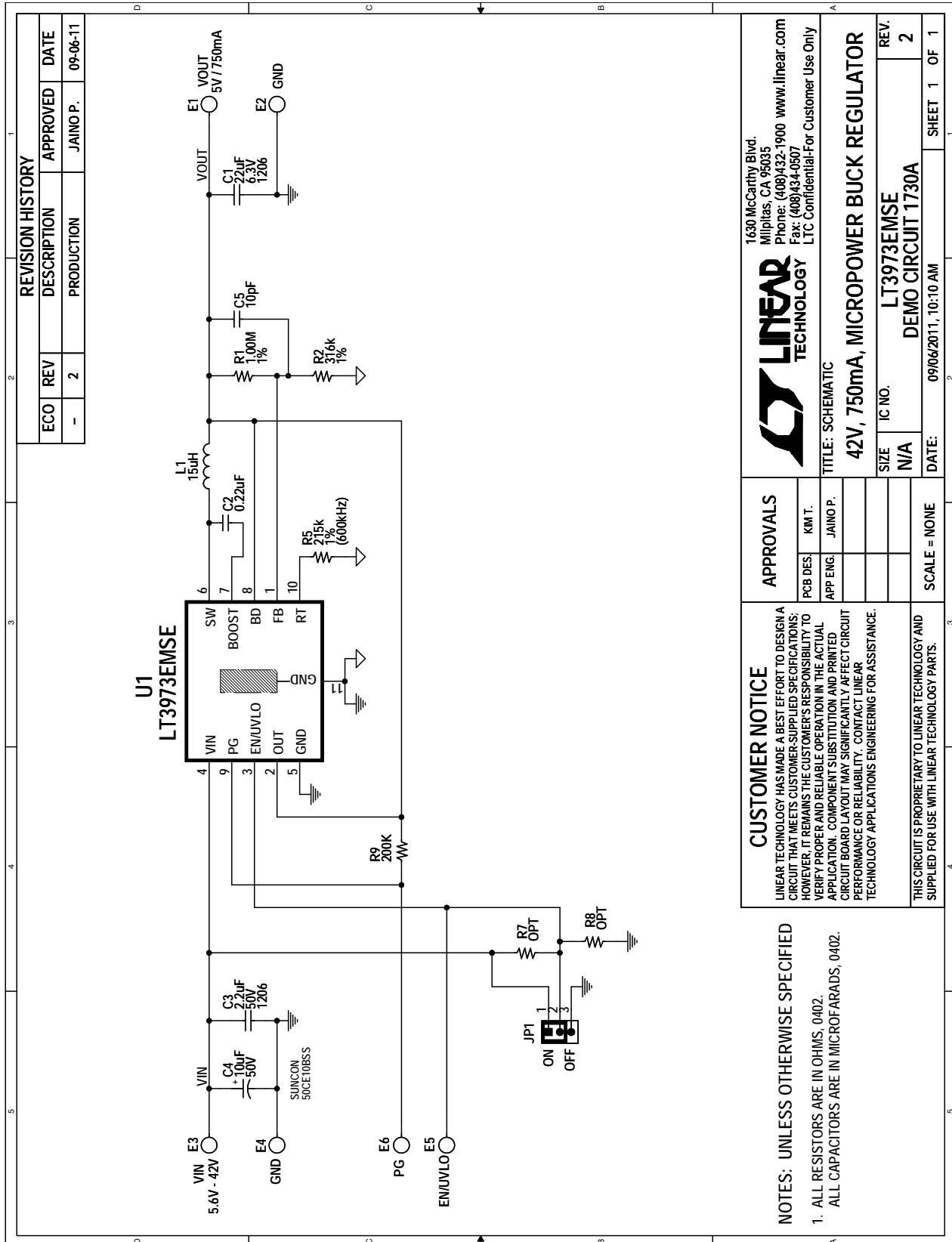
Figure 3. Measuring Input or Output Ripple

# DEMO MANUAL DC1730A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>REQUIRED CIRCUIT COMPONENTS</b>				
1	1	C1	CAP, X5R 22 $\mu$ F 6.3V 20% 1206	TAIYO YUDEN JMK316BJ226ML-T
2	1	C2	CAP, X5R 0.22 $\mu$ F 10V 20% 0402	AVX, 0402ZD224MAT2A
3	1	C3	CAP, X7R 2.2 $\mu$ F 50V 10% 1206	MURATA, GRM31CR71H225KA88L
4	1	C5	CAP, NPO, 10pF, 25V, 10%, 0402	AVX, 04023A100KAT2A
5	1	L1	IND, 15 $\mu$ H	COOPER/COILTRONICS, MPI4040R3-150-R
6	1	R1	RES., CHIP, 1.00M, 1/16W, 1%, 0402	NIC, NRC04F1004TRF
7	1	R2	RES., CHIP, 316k, 1/16W, 1%, 0402	NIC, NRC04F3163TRF
8	1	R5	RES., CHIP, 215k, 1/16W, 1%, 0402	NIC, NRC04F2153TRF
9	1	R9	RES., CHIP, 200k, 1/16W, 5%, 0402	NIC, NRC04J204TRF
10	1	U1	I.C., Buck Reg. MSE10	LINEAR TECH., LT3973EMSE
<b>ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS</b>				
1	1	C4	CAP, ALUMINUM EL. 10 $\mu$ F, 50V	SUN ELECT, 50CE10BSS
2	0	R7-R8	RES., 0402	
<b>HARDWARE FOR DEMO BOARD ONLY</b>				
1	6	E1-E6	TURRET, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	JP1	JMP, 1X3-079	WÜRTH, 62000311121
3	1	SHUNT	SHUNT, 2mm Ctrs.	WÜRTH, 60800213421

**SCHEMATIC DIAGRAM**



REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
-	2	PRODUCTION	JAINO P.	09-06-11

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TITLE: SCHEMATIC  
**42V, 750mA, MICROPOWER BUCK REGULATOR**

SIZE: N/A IC NO.: **LT3973EMSE** REV.: **2**  
 DATE: 09/06/2011, 10:10 AM SHEET 1 OF 1

**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 OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

**APPROVALS**  
 PCB DES. KM.T.  
 APP ENG. JAINO P.

SCALE = NONE

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

**NOTES: UNLESS OTHERWISE SPECIFIED**  
 1. ALL RESISTORS ARE IN OHMS, 0402.  
 ALL CAPACITORS ARE IN MICROFARADS, 0402.

# DEMO MANUAL DC1730A

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