

# LTC3639EMSE

## High Efficiency 150V, 100mA Synchronous Buck Converter

### DESCRIPTION

Demonstration circuit 1901A is a 150V input, 100mA output DC/DC power supply featuring the LTC3639. The IC operates in a high efficiency Burst Mode<sup>®</sup> operation and includes internal high and low side power MOSFETs. The board will accept an input voltage between 4V and 150V, and provide jumper selected output voltages of 1.8V, 3.3V, 5V and an option for additional voltages. The IC includes internal soft-start and a provision for increasing soft-start time.

Included on the board is an ON/OFF jumper that can also be configured as a precision undervoltage lockout. Additional PC pads are included for programming current limit to optimize efficiency and for reducing output voltage ripple and reducing component size. A terminal (FBO)

is included to allow multiple boards to be paralleled for higher output current.

Output voltage between 800mV and  $V_{IN}$  can be programmed using optional resistors. (Higher voltage rating output capacitors may be required.)

The LTC3639 data sheet gives a complete description of the IC operation and application information. The data sheet must be read in conjunction with this quick start guide.

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

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### PERFORMANCE SUMMARY Specifications are at $T_A = 25^\circ\text{C}$

PARAMETER	CONDITION	VALUE
Input Voltage Range		4V to 150V
1.8V Output Voltage	$V_{IN} = 12\text{V}$ , $I_{OUT} = 0\text{A}$ to 100mA	1.8V $\pm 2\%$
3.3V Output Voltage	$V_{IN} = 12\text{V}$ , $I_{OUT} = 0\text{A}$ to 100mA	3.3V $\pm 2\%$
5V Output Voltage	$V_{IN} = 12\text{V}$ , $I_{OUT} = 0\text{A}$ to 100mA	5V $\pm 2\%$
Maximum Output Current, $I_{OUT}$	$V_{IN} = 4\text{V}$ to 150V, $V_{OUT} = 1.8\text{V}$ , 3.3V or 5V	100mA
Typical Efficiency	$V_{IN} = 12\text{V}$ , $V_{OUT} = 5\text{V}$ , $I_{OUT} = 100\text{mA}$	87.3%
Typical Output Ripple	$V_{IN} = 150\text{V}$ , $V_{OUT} = 5\text{V}$ , $I_{OUT} = 100\text{mA}$ (20MHz BW)	66mV <sub>P-P</sub>

## QUICK START PROCEDURE

Demonstration circuit 1901A is easy to set up to evaluate the performance of the LTC3639. Refer to Figure 1 for the proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply (set for 0V) to  $V_{IN}$  and GND (input return).
2. Select 5V output using jumper JP1 (B position) and JP2 (A position). Select ON position for JP3.
3. Connect the 5V output load between  $V_{OUT}$  and GND (Initial load: no load).
4. Connect the DVMs to the input and outputs.
5. Turn on the input power supply and slowly increase to 12V. Check for the proper output voltages. (5V output should be within  $5V \pm 2\%$ .)
6. 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.

7. With power off, move jumpers JP1 and JP2 to the other fixed voltage settings (1.8V or 3.3V). Repeat steps 5 and 6. Check for the proper output voltage and other parameters.

NOTE: When measuring the output or input voltage ripple, do not use the long ground lead on the oscilloscope probe. See Figure 2 for the proper scope probe technique. Short, stiff leads need to be soldered to the (+) and (-) terminals of an output capacitor. The probe's ground ring needs to touch the (-) lead and the probe tip needs to touch the (+) lead.

ADDITIONAL NOTES:

### CAUTION:

**Be careful when testing with high voltage. High voltage can result in an electric shock if care is not taken.**

For 5V output,  $V_{IN}$  input voltage should be at least 5V or higher.

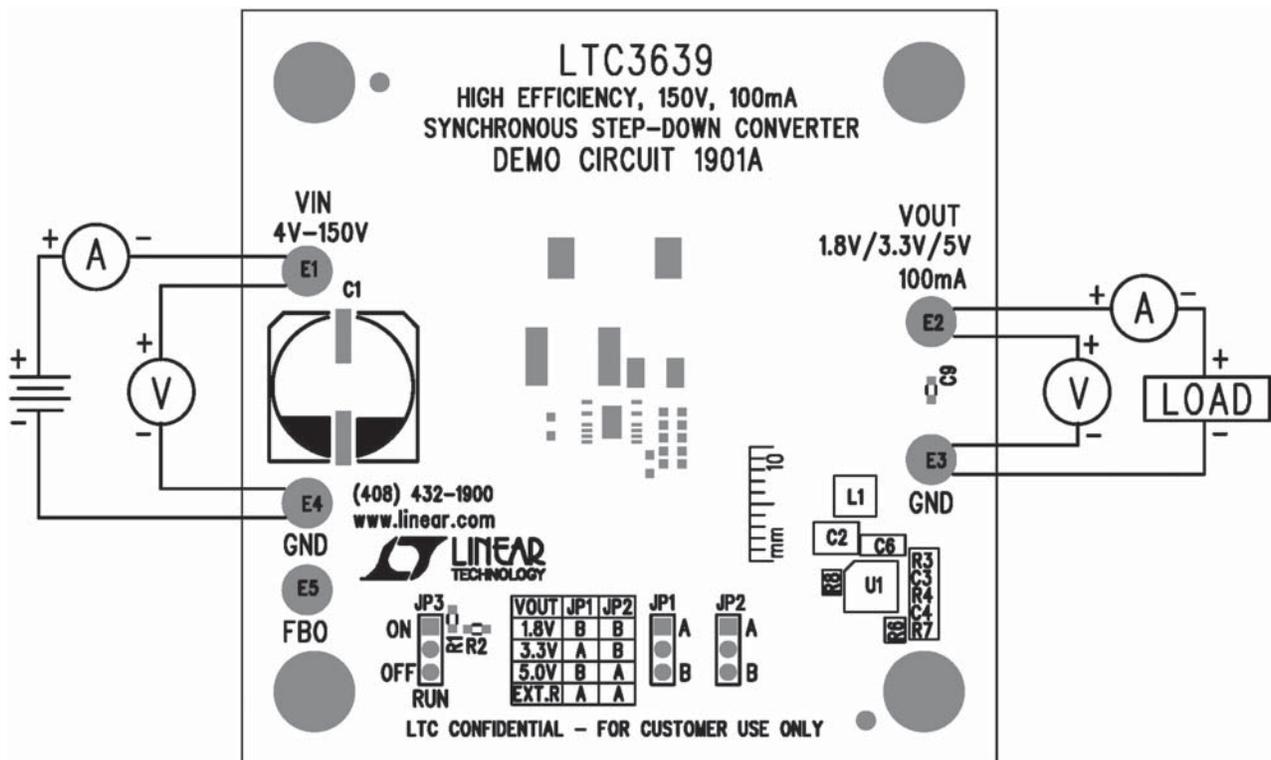
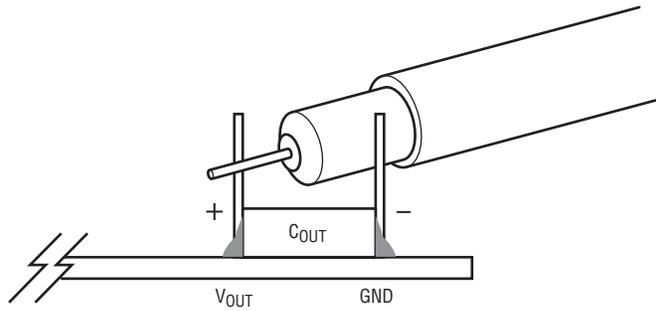
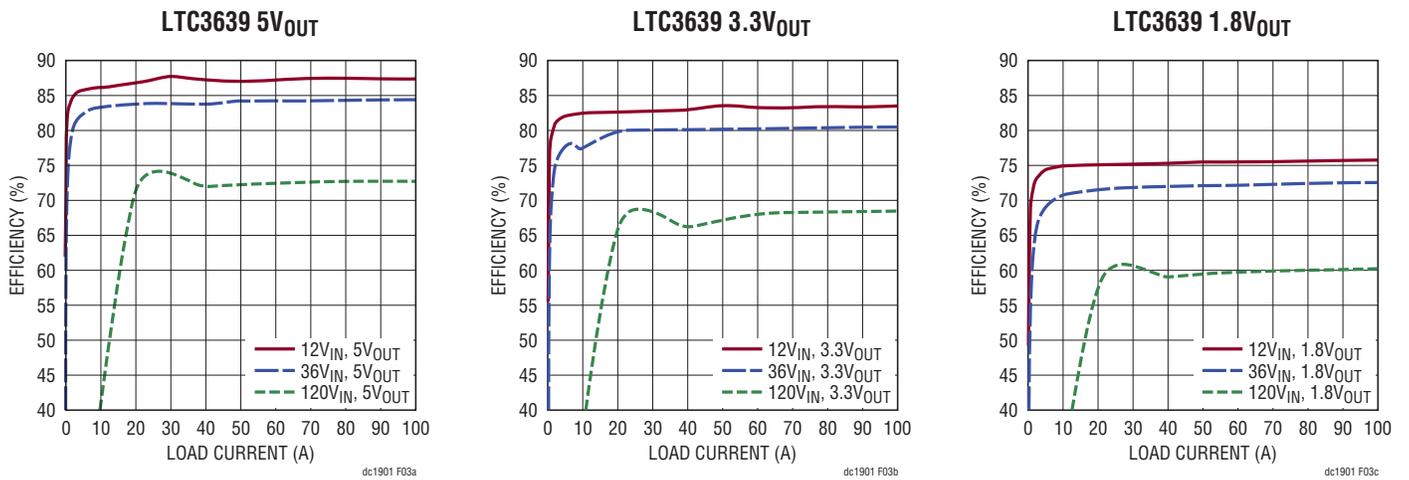


Figure 1. Proper Measurement Equipment Setup

**QUICK START PROCEDURE**



**Figure 2. Measuring Output Voltage Ripple**



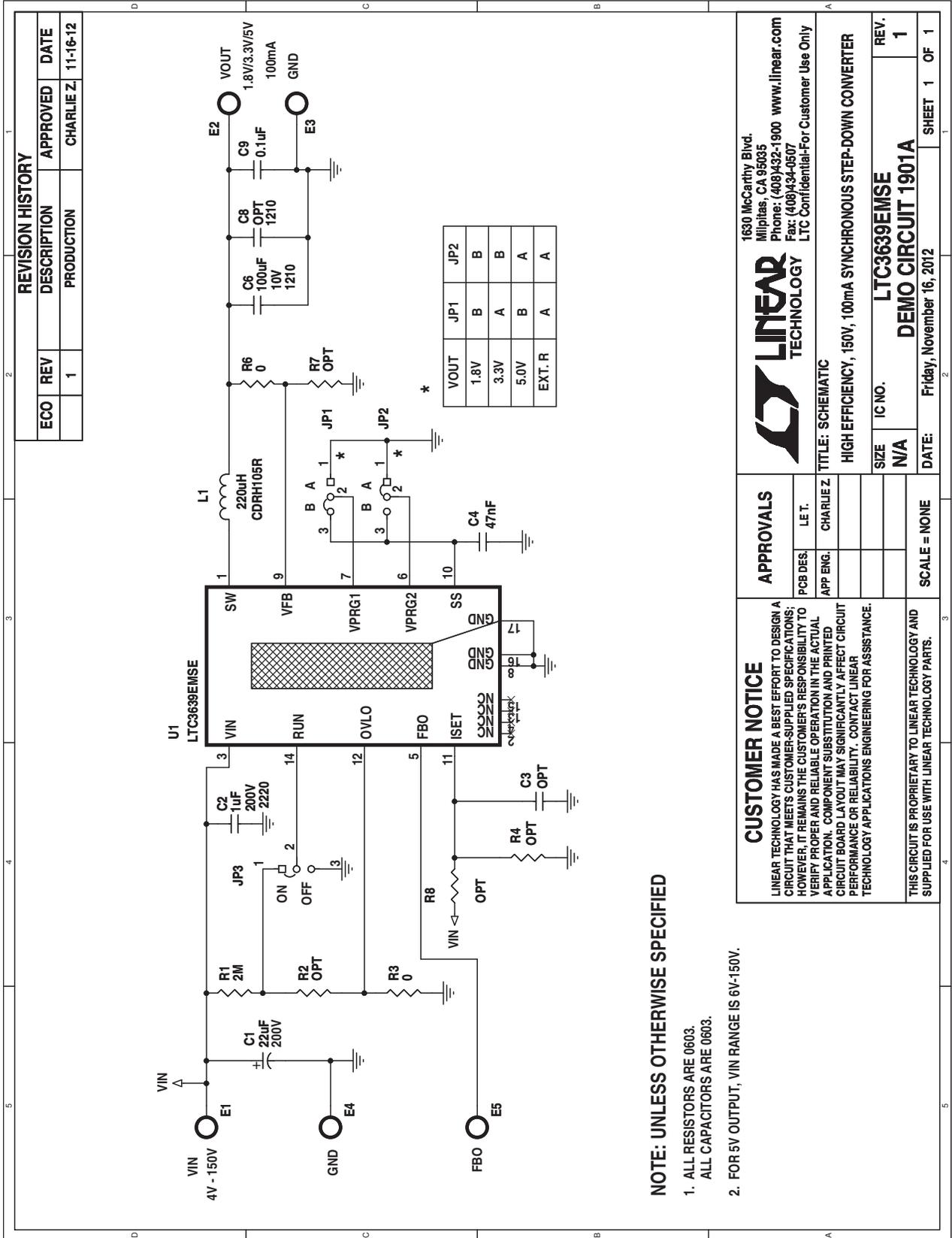
**Figure 3. Efficiency vs Load Current**

# DEMO MANUAL DC1901A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	1	C1	ALUM. ELECT 22 $\mu$ F 200V MVE Series 12.5x16mm	NIPPON CHEMI-CON, EMVE201ARA220MKG5S
2	1	C2	CAP., X7R, 1 $\mu$ F, 200V, 10% 2220	KEMET, C2220X105K2RAC7533
3	1	C4	CAP., X7R, 47nF, 25V, 10% 0603 0.047 $\mu$ F	AVX, 06033C473KAT2A
4	1	C6	CAP., X7R, 100 $\mu$ F, 10V, 20% 1210	TAIYO YUDEN, LMK325ABJ107MM-T
5	1	C9	CAP., X7R, 0.1 $\mu$ F, 25V, 10% 0603	AVX, 06033C104KAT2A
6	1	L1	INDUCTOR, 220 $\mu$ H	SUMIDA, CDRH105RNP-221NC
7	1	R1	RES., CHIP, 2M, 1/10W, 5% 0603	VISHAY, CRCW06032M00JNEA
8	2	R3, R6	RES., CHIP, 0 $\Omega$ , 1/10W, 0603	VISHAY, CRCW06030000Z0EA
9	1	U1	IC., LTC3639EMSE MSE16(12), 4X3MM	LINEAR TECH., LTC3639EMSE#PBF
<b>Additional Demo Board Circuit Components</b>				
10	0	C3	CAP., 0603	OPT
11	0	C8	CAP., 1210	OPT
12	0	R2, R4, R7, R8	RES., 0603	OPT
<b>Hardware: For Demo Board Only</b>				
13	5	E1, E2, E3, E4, E5	TESTPOINT, TURRET, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0
14	3	JP1, JP2, JP3	HEADER, 3 PIN 0.079" SINGLE ROW	SULLINS, NRPNO31PAEN-RC
15	3	XJP1, XJP2, XJP3	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G

**SCHEMATIC DIAGRAM**



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