

# SEPIC/Boost DC/DC Converter with 2A, 70V Switch, and 7 $\mu$ A Quiescent Current

## DESCRIPTION

Demonstration circuit 2242A is a monolithic SEPIC converter featuring LT<sup>®</sup>8494. The demo board is designed for 5V output from a 3V to 60V input at 450kHz switching frequency. The max output current is 1A when the input voltage is above 12V, and is reduced with lower input voltage. The quiescent current of LT8494 is less than 7 $\mu$ A when operating. Dual supply pins ( $V_{IN}$  and BIAS) allow the part to automatically operate from the most efficient supply.

Low ripple Burst Mode<sup>®</sup> operation increases the efficiency at the light load while keeping the output ripple below 10mV. Figure 1 shows the demo board efficiency at 12V input voltage. Figure 2 shows the maximum load current with different input voltages of the demo board.

The LT8494 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this demo manual for DC2242A. The LT8494 is assembled in 20-lead QFN and 20-lead plastic TSSOP packages. Proper board layout is essential for maximum thermal and electrical performance. See the data sheet sections for details.

**Design files for this circuit board are available at <http://www.linear.com/demo/DC2242A>**

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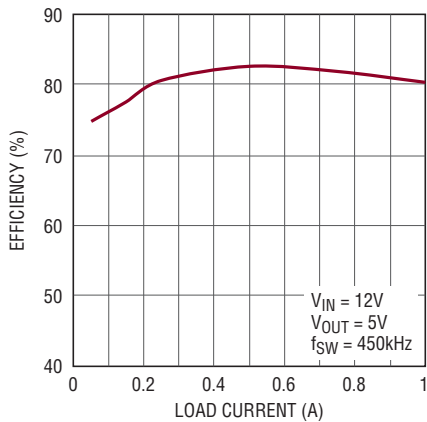


Figure 1. LT8494 Efficiency

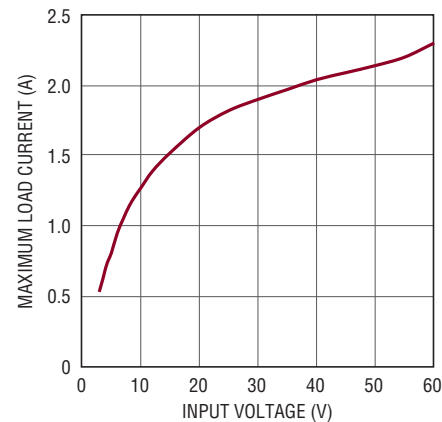


Figure 2. LT8494 Maximum Load Current (Typical) vs Input Voltage

## PERFORMANCE SUMMARY

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

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IN}$	Input Supply Range		3		60	V
$V_{OUT}$	Output Voltage		4.86	5.04	5.24	V
$f_{SW}$	Switching Frequency	$R_T = 169\text{k}\Omega$	414	450	477	kHz
$I_{OUT}$	Max Output Current	$V_{IN} = 12\text{V}$	1			A
EFE	Efficiency at DC	$V_{IN} = 12\text{V}, I_{OUT} = 1\text{A}$		80.3		%

## QUICK START PROCEDURE

DC2242A is easy to set up to evaluate the performance of the LT8494. Refer to Figure 3 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 4 for the proper scope technique.

1. With power off, connect the input power supply to  $V_{IN}$  and GND. Make sure that the input voltage does not exceed 60V.
2. With power off, connect loads from  $V_{OUT}$  to GND.
3. Turn on the power at the input.
4. Check for the proper output voltages ( $V_{OUT} = 5V$ ).  
NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high or is shorted.
5. Once the proper output voltage is established, adjust the load within the operating ranges and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

**QUICK START PROCEDURE**

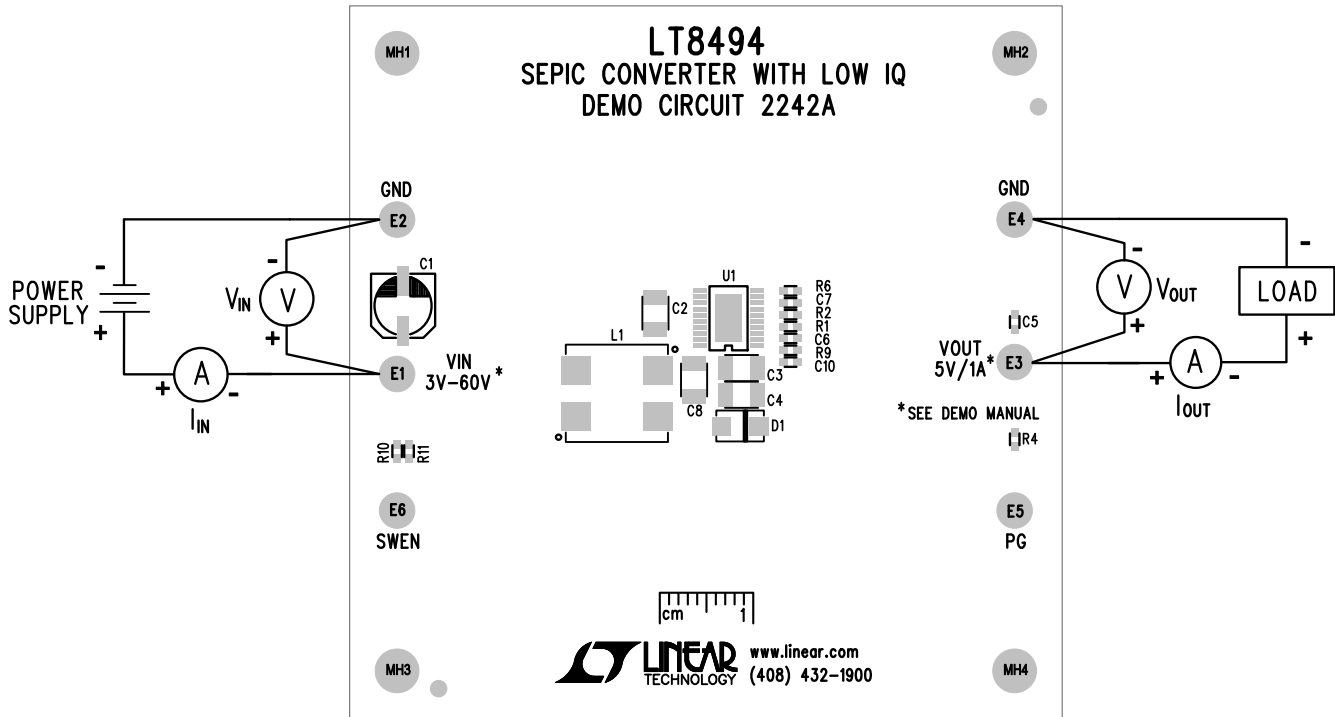


Figure 3. Proper Measurement Equipment Setup

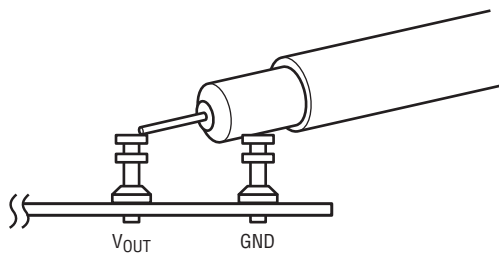


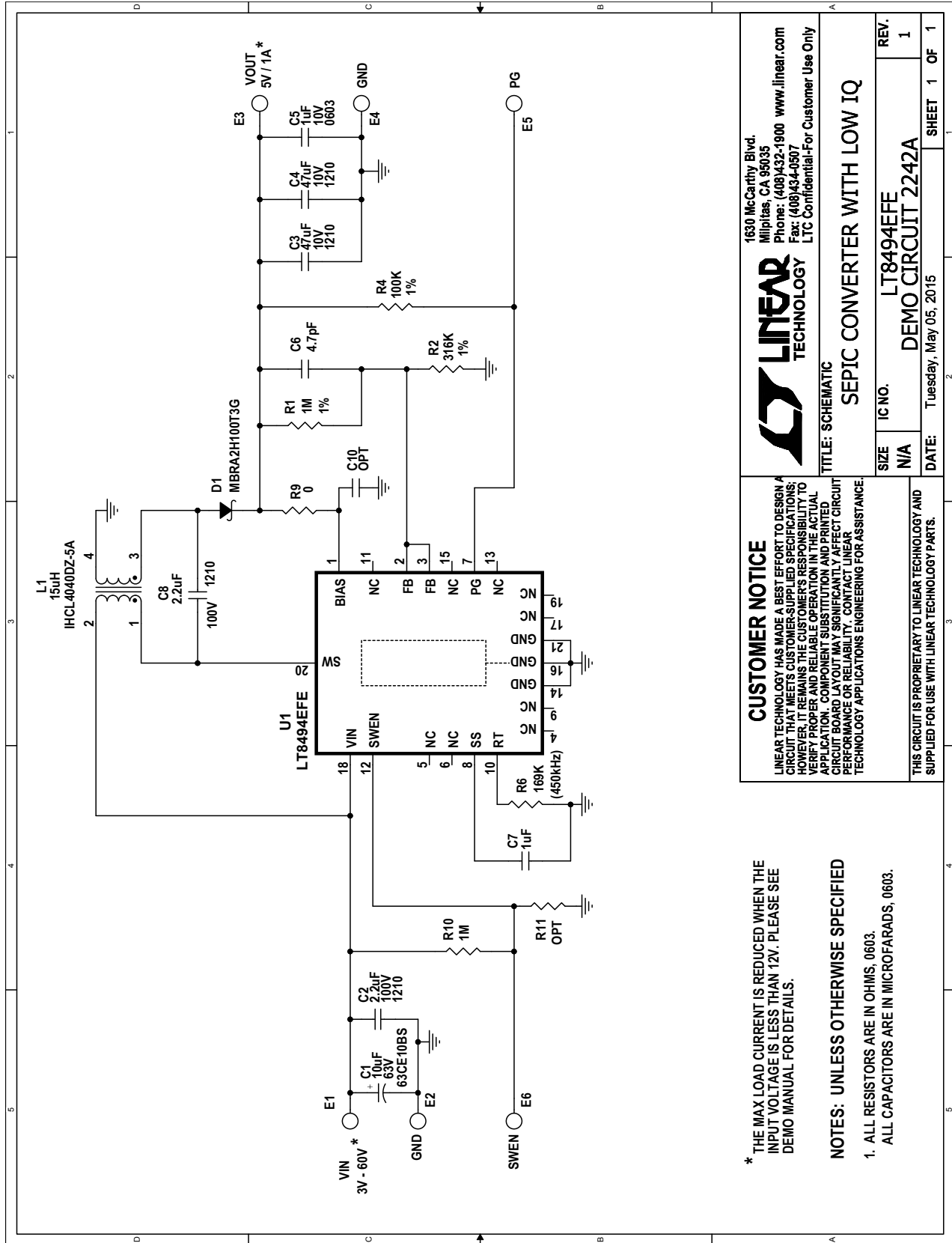
Figure 4. Measuring Input or Output Ripple

# DEMO MANUAL DC2242A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	2	C2, C8	CAP., X7R, 2.2 $\mu$ F, 100V, 10%, 1210	MURATA, GRM32ER72A225KA35L
2	2	C3, C4	CAP., X7R, 47 $\mu$ F, 10V, 10%, 1210	MURATA, GRM32ER71A476KE15L
3	2	C5, C7	CAP., X7R, 1 $\mu$ F, 10V, 10%, 0603	MURATA, GRM188R71A105KA61D
4	1	C6	CAP., NPO, 4.7pF, 50V, $\pm$ 0.25pF, 0603	MURATA, GRM1885C1H4R7CA01D
5	1	D1	DIODE, SCHOTTKY 100V, 2A, SMA	ON SEMI., MBRA2H100T3G
6	1	L1	INDUCTOR, 15 $\mu$ H	VISHAY, IHCL4040DZER150M5A
7	2	R1, R10	RES., CHIP, 1M, 1/10W, 0603	VISHAY, CRCW06031M00FKEA
8	1	R2	RES., CHIP, 316K, 1/10W, 1%, 0603	VISHAY, CRCW0603316KFKEA
9	1	R4	RES., CHIP, 100k, 1/10W, 1%, 0603	VISHAY, CRCW0603100KFKEA
10	1	R6	RES., CHIP, 169k, 1/10W, 1%, 0603	VISHAY, CRCW0603169KFKEA
11	1	R9	RES., CHIP, 0, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
12	1	U1	I.C., , LT8494, TSSOP-20-4.4mm	LINEAR TECH., LT8494EFE#PBF
<b>Additional Demo Board Circuit Components</b>				
1	1	C1	CAP., ALUM, 10 $\mu$ F, 63V, 20%	SUN ELECTRONIC, 63CE10BS
2	0	C10 (OPT)	CAP., OPTION, 0603	OPT
3	0	R11 (OPT)	RES., OPTION, 0603	OPT
<b>Hardware: For Demo Board Only</b>				
1	6	E1-E6	TESTPOINT, TURRET, .094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0

**SCHEMATIC DIAGRAM**



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

**TITLE: SCHEMATIC**  
**SEPIC CONVERTER WITH LOW IQ**

SIZE	IC NO.	REV.
N/A	LT8494EFE	1
DATE:	DEMO CIRCUIT 2242A	SHEET 1 OF 1
	Tuesday, May 05, 2015	

\* THE MAX LOAD CURRENT IS REDUCED WHEN THE INPUT VOLTAGE IS LESS THAN 12V. PLEASE SEE DEMO MANUAL FOR DETAILS.

**NOTES: UNLESS OTHERWISE SPECIFIED**

1. ALL RESISTORS ARE IN OHMS, 0603.  
 ALL CAPACITORS ARE IN MICROFARADS, 0603.

# DEMO MANUAL DC2242A

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