

LT8331 Boost/SEPIC/Inverting Regulator

DESCRIPTION

Demonstration circuit DC2275A features the LT[®]8331 in boost configuration. The demo circuit demonstrates small size and low component count. The boost is designed to convert a 10V to 48V source to 120V at 25mA to 80mA.

DC2275A includes an optional circuit on the back of the board for a charge pump that can be used to double the output voltage.

The default mode for this application is pulse-skip mode, but removal of R13 allows for other modes to be used for different applications. A jumper from sync to ground will put the converter in Burst Mode[®] operation, or an external clock can be used to synchronize the converter to an external frequency.

The LT8331 can operate with inputs as high as 100V but in this demo circuit, the input is limited by the voltage rating of the input capacitor.

The LT8331 includes many other features such as synchronization to external clock, user configurable undervoltage lockout, soft-start, frequency foldback, and it is easily configured as boost, SEPIC or inverting converter.

The data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this demo manual for DC2275A.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2275A>

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PERFORMANCE SUMMARY

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

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range		10		48	V
V_{OUT}	Output Voltage Range	$V_{IN} = 12\text{V}$, $I_{LOAD} = 30\text{mA}$	116.4	120	123.6	V
RIPPLE		$V_{IN} = 12\text{V}$, $I_{LOAD} = 30\text{mA}$		200		mV
EFFICIENCY		$V_{IN} = 24\text{V}$, $I_{LOAD} = 55\text{mA}$		90		%
EFFICIENCY		$V_{IN} = 12\text{V}$, $I_{LOAD} = 30\text{mA}$		79		%
SWITCHING FREQUENCY				200		kHz

QUICK START PROCEDURE

Demonstration circuit DC2275A is easy to set up to evaluate the performance of the LT8331. 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 VIN or VOUT and GND terminals. See Figure 3 for proper scope probe technique.

1. With power off, connect the input power supply to VIN and GND.

2. Turn on the power at the input.

NOTE: Make sure that the input voltage does not exceed 48V.

3. 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.

4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

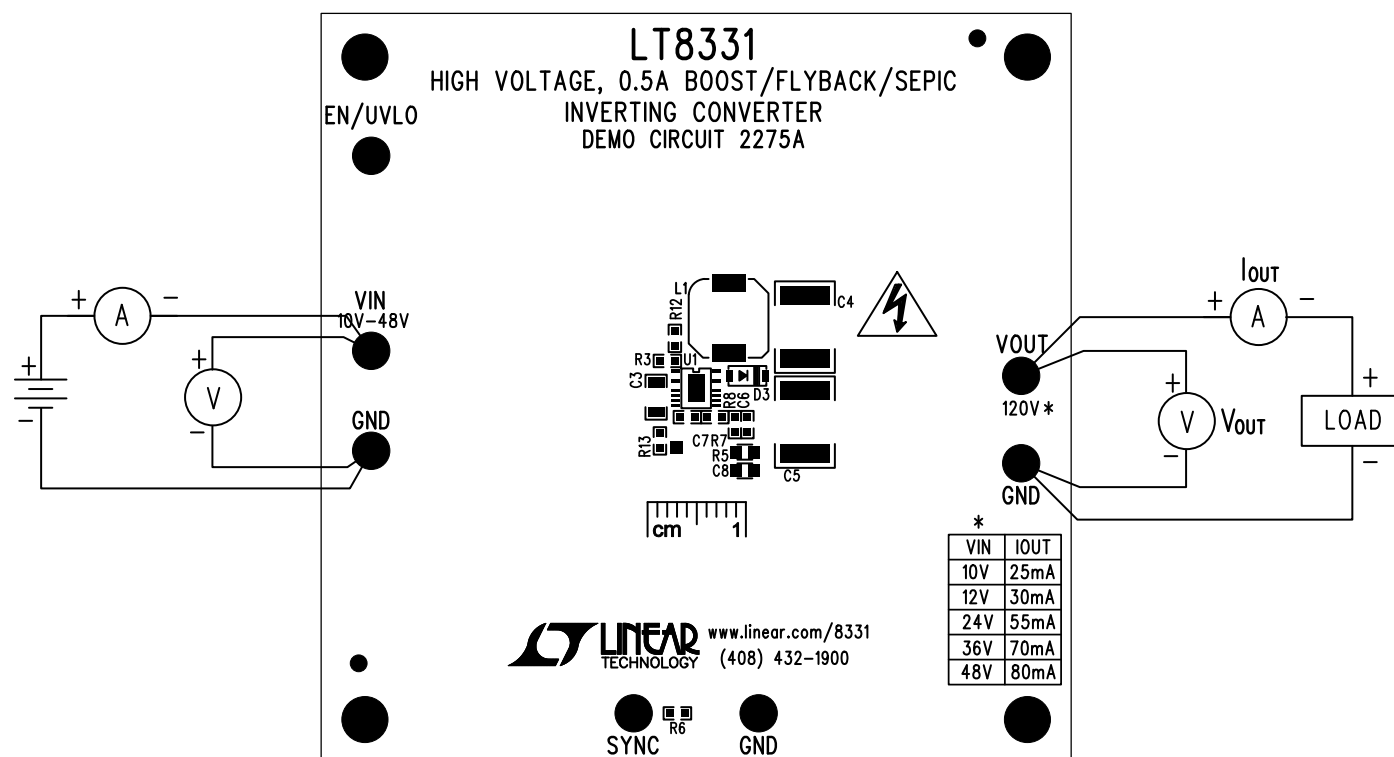


Figure 1. DC2275A Proper Equipment Setup

QUICK START PROCEDURE

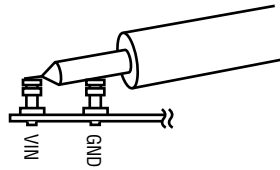


Figure 2. Measuring Input or Output Ripple

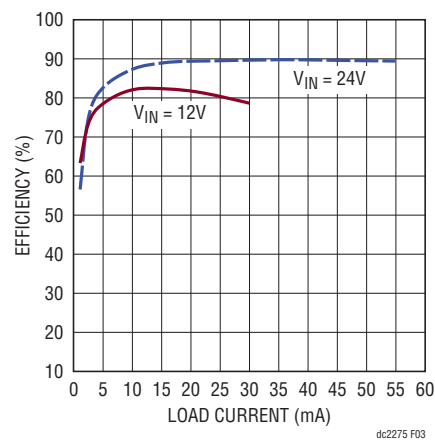


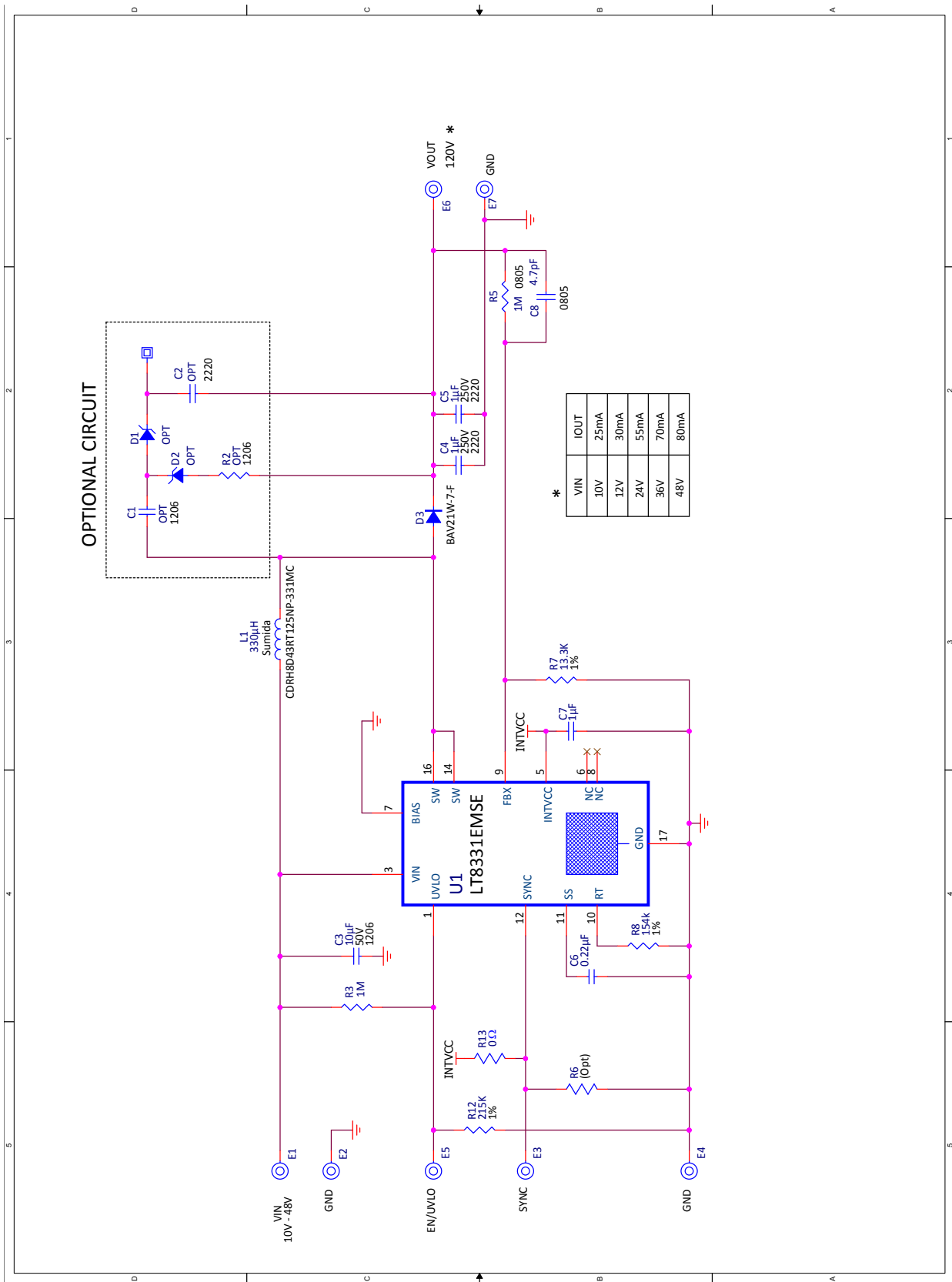
Figure 3. Efficiency vs Load

DEMO MANUAL DC2275A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C3	CAP., X5R 10 μ F 50V 10% 1206	MURATA, GRM31CR61H106KA12L
2	2	C4, C5	CAP., X7R 1 μ F 250V 10% 2220	MURATA, GRM55DR72E105KW01L
3	1	C6	CAP., X7R 0.22 μ F 25V 10% 0603	MURATA, GRM188R71E224KA88D
4	1	C7	CAP., X5R 1 μ F 25V 20% 0603	AVX, 06033D105MAT2A
5	1	C8	CAP., C0G, 4.7pF, 250V, $\pm$ 0.25pF, 0805	MURATA, GQM2195C2E4R7CB12J
6	1	D3	DIODE, SCHOTTKY, SOD123	DIODES INC., BAV21W-7-F
7	1	L1	INDUCTOR, 330 μ H $\pm$ 20%	SUMIDA, CDRH8D43RT125NP-331MC
8	1	R3	RES., CHIP 1M 0.1W 5% 0603	VISHAY, CRCW06031M00JNEA
9	1	R5	RES., CHIP 1M 0.125W 1% 0805	VISHAY, CRCW08051M00FKEA
10	1	R7	RES., CHIP 13.3k 0.1W 1% 0603	VISHAY, CRCW060313K3FKEA
11	1	R8	RES., CHIP 154k 0.1W 1% 0603	VISHAY, CRCW0603154KFKEA
12	1	R12	RES., CHIP 215k 0.1W 1% 0603	VISHAY, CRCW0603215KFKEA
13	1	R13	RES., CHIP 0 Ω 0.1W 1% 0603	VISHAY, CRCW06030000Z0EA
14	1	U1	I.C., CONVERTER CONTROLLER	LINEAR TECH. CORP. LT8331EMSE
15	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 2275A
Additional Demo Board Circuit Components				
1	0	C1 (Opt)	CAP., 1206	
2	0	C2 (OPT)	CAP., 2220	
4	0	D1, D2 (OPT)	DIODE, SOD123	
5	0	R2 (OPT)	RES., 1206	
6	0	R6 (OPT)	RES., 0603	
Hardware: For Demo Board Only				
1	7	E1, E2, E3, E4, E5, E6, E7	TURRET, TESTPOINT	MILL-MAX, 2501-2-00-80-00-00-07-0
2	4	MH1-MH4	STANDOFF, NYLON 0.25"	KEystone, 8831 (SNAP-ON)

SCHEMATIC DIAGRAM



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