DESCRIPTION

Demonstration circuit 1200 is a 60V, 100kHz, 2A load current, monolithic step-down DC/DC switching converter using the LT3430-1. With its wide input voltage range, 3A internal power switch, and thermally enhanced package, the LT3430-1 is a very versatile and powerful IC for DC/DC converters that require compact space and a wide variety of input voltage ranges. The constant 100kHz switching frequency allows the input voltage to be as high as 60V for a 3.3V output without pulse-skipping. The current-mode control topology creates fast transient response and good loop stability with a minimum number of external compensation components and the use of ceramic input and output capacitors if desired. The low resistance internal power switch (0.1Ω) and 100kHz switching frequency give efficiencies up to 90%. The 30μA shutdown current extends battery life. The wide input range allows step-down configurations with input voltages between 5.5V and 60V. The LT3430-1 is synchronizable above 125kHz. Please refer to the datasheet for details.

Demonstration Circuit 1200 is a step-down converter using the LT3430-1. The circuit is designed for 5.5-60V input to 3.3V output at 2A load current for automotive, industrial, portable computers, battery chargers, and distributed power systems. This board was designed for wide input voltage range applications with low component count and up to 2A of load current. The low-ESR tantalum output capacitor reduces output voltage ripple.

The LT3430/LT3430-1 datasheet is available at www.linear.com for more details regarding LT3430-1 applications and specifications.

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

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Table 1. Typical Performance Summary

PARAMETER	CONDITION	VALUE
Steady State Input Voltage Range	V_{OUT} = 3.3V, I_{OUT} <= 2A	5.5 – 60V
Maximum Transient Input Voltage	All Vout (customized)	60V
V_{OUT}	I_{OUT} <= 2A	3.3V ±3%
Maximum Output Current		2A
Typical Switching Frequency		100kHz
Efficiency	V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 500mA	85%
Output Voltage Ripple	V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 2A	25mV_{PK-PK}

QUICK START PROCEDURE

Demonstration circuit 1200 is easy to set up to evaluate the performance of the LT3430-1. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE: Make sure that the input voltage does not exceed 60V.

NOTE: Do not hotplug the input at voltages above 24V to prevent input overvoltage.

1. Connect the 5.5-60V input power supply to the Vin and GND terminals on the board with the power supply turned OFF.
2. Connect an ammeter in series with the input supply to measure input current.
3. Connect either power resistors or an electronic load to the Vout and GND terminals on the board.
4. Connect an ammeter in series with output load to measure output current.
5. Connect a voltmeter across the Vin and GND terminals to measure input voltage.
6. Connect a voltmeter across the Vout and GND terminal to measure output voltage.
7. After all connections are made, turn on input power and verify that the output voltage is 3.3V.
8. The synchronization and shutdown functions are optional and their pins can be left floating (disconnected) if their functions are not being used.

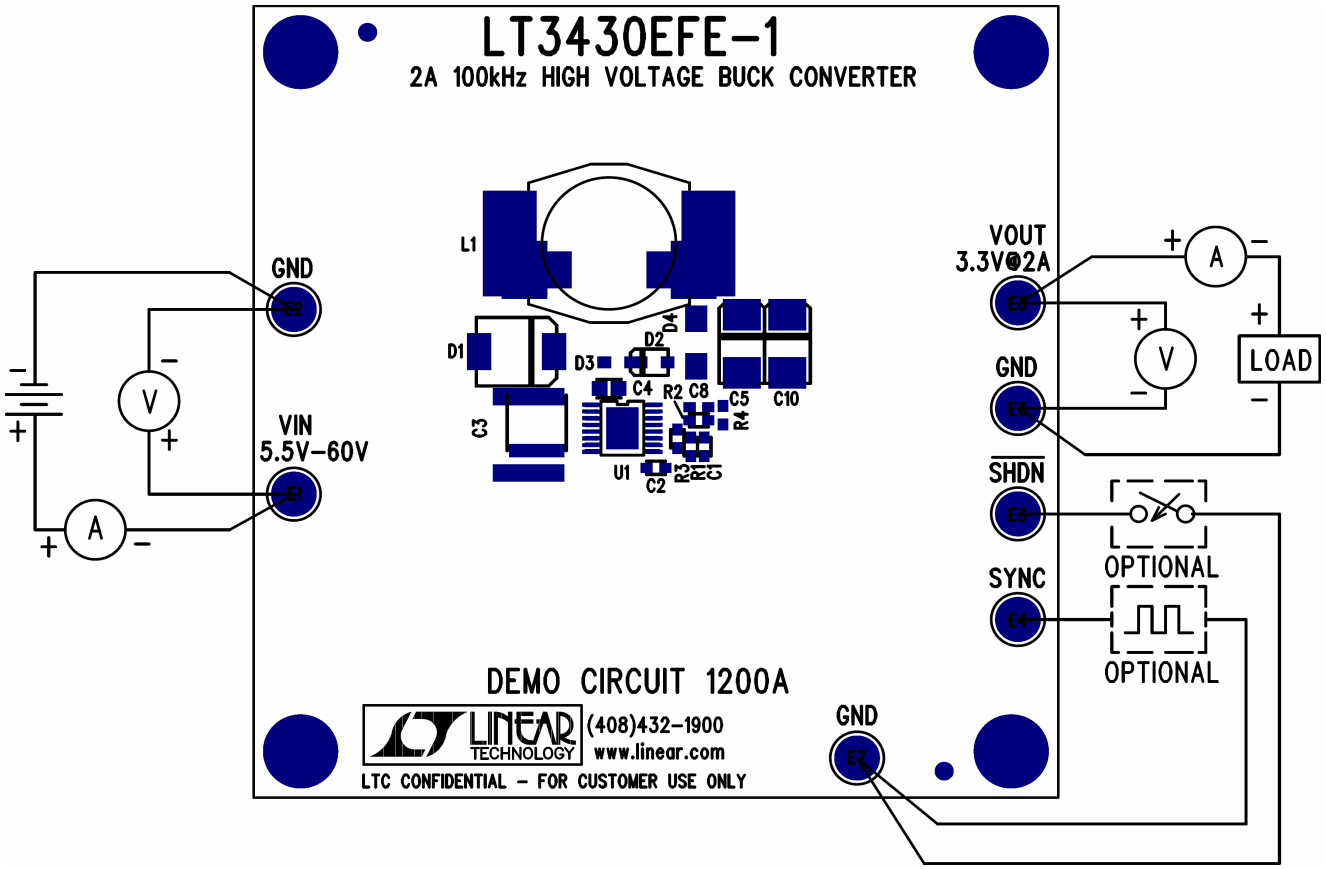


Figure 1. Proper Measurement Equipment Setup

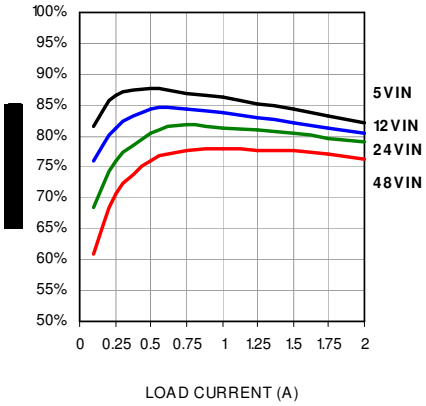


Figure 2. Typical shutdown current versus input voltage

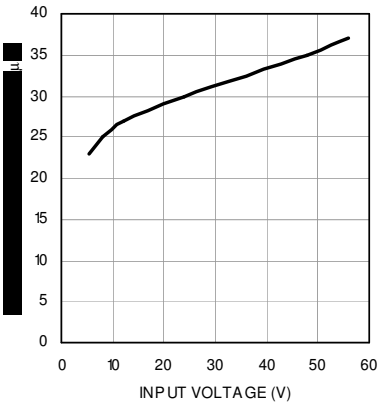


Figure 3. Typical shutdown current versus input voltage

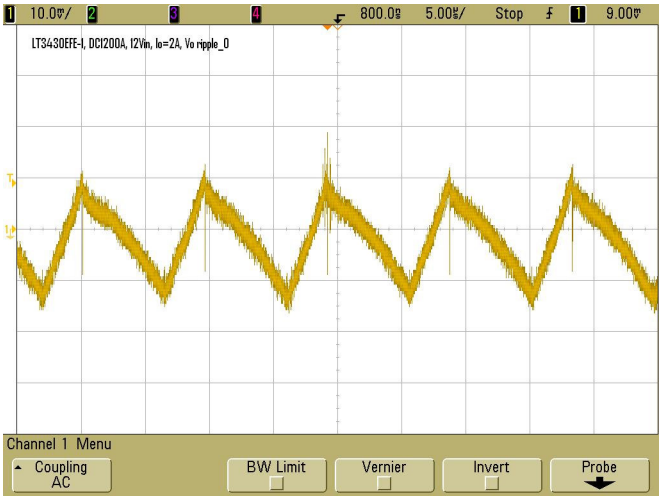


Figure 4. Typical VOUT ripple 12VIN 2A load

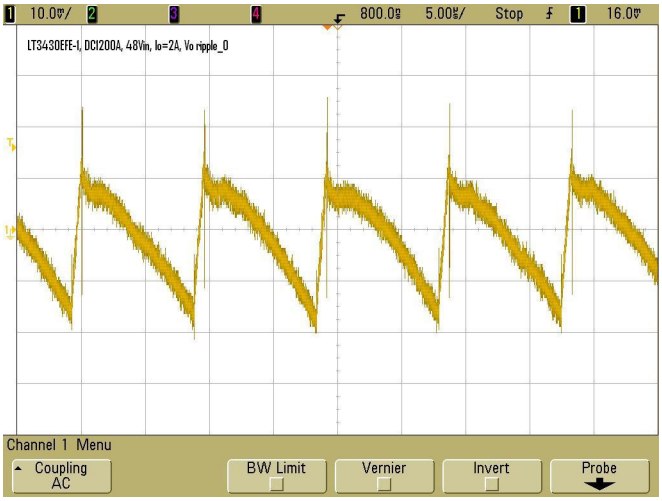
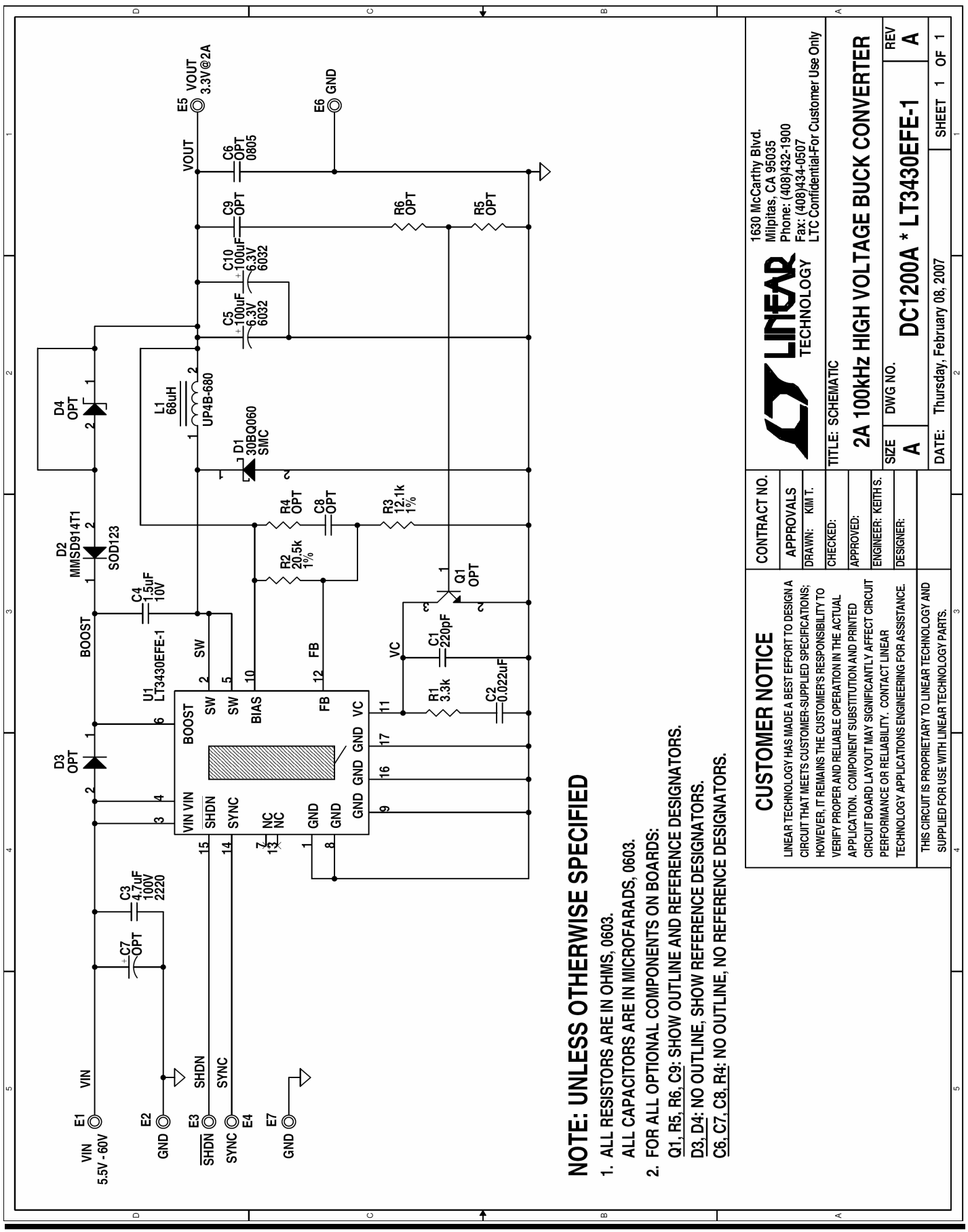


Figure 5. Typical VOUT ripple 48VIN 2A load


E1 VIN
E2 GND
E3 SHDN
E4 SYNC
E5 VOUT 3.3V@2A
E6 GND
E7 GND
VIN 5.5V - 60V
U1 LT3430EFE-1
BOOST
SW
SW
BIAS
FB
VC
VIN VIN
SHDN
SYNC
NC NC
GND GND GND GND GND
L1 68uH UP4B-680
D1 30BQ060 SMC
D2 MMSD914T1 SOD123
D3 OPT
D4 OPT
C1 220pF
C2 0.022uF
C3 4.7uF 100V 2220
C4 1.5uF 10V
C5 100uF 6.3V 6032
C6 OPT 0805
C7 OPT
C8 OPT
C9 OPT
C10 100uF 6.3V 6032
R1 3.3k
R2 20.5k 1%
R3 12.1k 1%
R4 OPT
R5 OPT
R6 OPT
Q1 OPT
NOTE: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0603.
ALL CAPACITORS ARE IN MICROFARADS, 0603.
2. FOR ALL OPTIONAL COMPONENTS ON BOARDS:
Q1, R5, R6, C9: SHOW OUTLINE AND REFERENCE DESIGNATORS.
D3, D4: NO OUTLINE, SHOW REFERENCE DESIGNATORS.
C6, C7, C8, R4: NO OUTLINE, NO REFERENCE DESIGNATORS.
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.
THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
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APPROVED:
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LTC Confidential-For Customer Use Only
TITLE: SCHEMATIC
2A 100kHz HIGH VOLTAGE BUCK CONVERTER
SIZE A
DWG NO. DC1200A * LT3430EFE-1
REV A
DATE: Thursday, February 08, 2007
SHEET 1 OF 1