DESCRIPTION

Demonstration circuit 613 is a 3A, 500kHz, step-down converter with 100uA quiescent current featuring the LT3435IFE. It produces 5V at 2A from an input range of 6.75V to 28V continuous, and can survive input transients up to 60V. The demonstration circuit includes a shutdown control, synchronization from 500kHz to 700kHz and a programmable power good indicator.

The LT3435 is a 500kHz monolithic buck switching regulator that accepts input voltages up to 60V. A high efficiency 3A, 0.1Ω switch is included on the die along with all the necessary oscillator, control and logic circuitry. Current mode topology is used for fast transient response and good loop stability.

Innovative design techniques along with a new high voltage process achieve high efficiency over a wide input range. Efficiency is maintained over a wide output current range by employing Burst Mode® operation at low currents, utilizing the output to bias the internal circuitry, and by using a supply boost capacitor to fully saturate the power switch.

For further information about the LT3435, please refer to the LT3435 data sheet.

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

Table 1. Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Turn On Input Voltage	V_{OUT} = 5VDC, I_{LOAD} = 2A	6.75VDC
Minimum Turn Off Input Voltage	V_{OUT} = 5VDC, I_{LOAD} = 2A	6.5V, typical
Maximum Input Voltage	Continuous 100mS transient	28VDC 60VDC
Output Voltage V_{OUT}	V_{IN} = 6.75 to 28VDC, I_{LOAD} = 0 to 2A	5V ± 4%
Maximum Output Current	V_{IN} = 6.75 to 28VDC, V_{OUT} = 5VDC	2A
Nominal Switching Frequency		500kHz
Synchronization Frequency Range	V_{IN} = 6.75 to 28VDC, V_{OUT} = 5VDC	500 – 700 KHz

QUICK START PROCEDURE

Demonstration circuit 613 is easy to set up to evaluate the performance of the LT3435IFE. 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 2 for proper scope probe technique.

1. While disconnected from the demonstration circuit, set the output of the input power source to its minimum positive value.
2. With power off, connect the input power supply to VIN and GND.
3. Connect the load.

4. Turn on the power at the input, ensuring that the voltage applied to the demonstration circuit is less than 28VDC.
5. Check for the proper output voltages. The output VOUT should be 5VDC.

   NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
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.
7. Verify the shutdown by pulling the $\overline{\text{SHDN}}$ (TP4) terminal to a logic low level.
8. Verify the power good function by monitoring the timing and voltage levels of the output voltage and PGOOD terminal (TP7).
9. Verify the synchronization function by applying a square wave signal of the appropriate amplitude and frequency to the SYNC terminal (TP5).

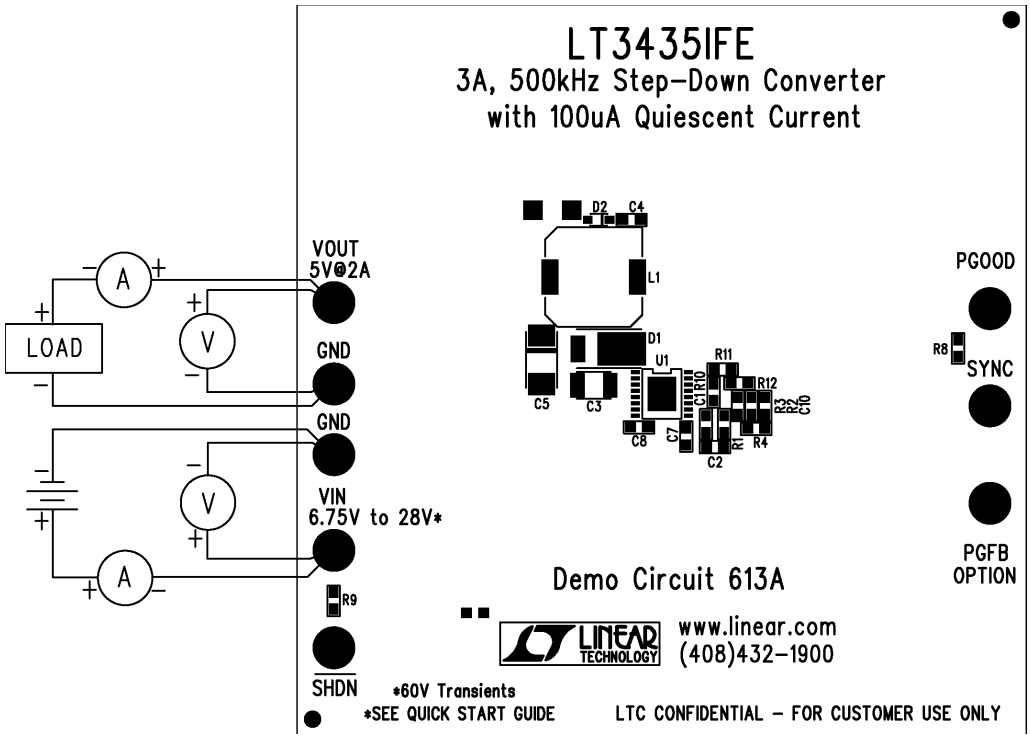


Figure 1. Proper Measurement Equipment Setup

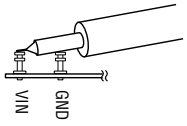
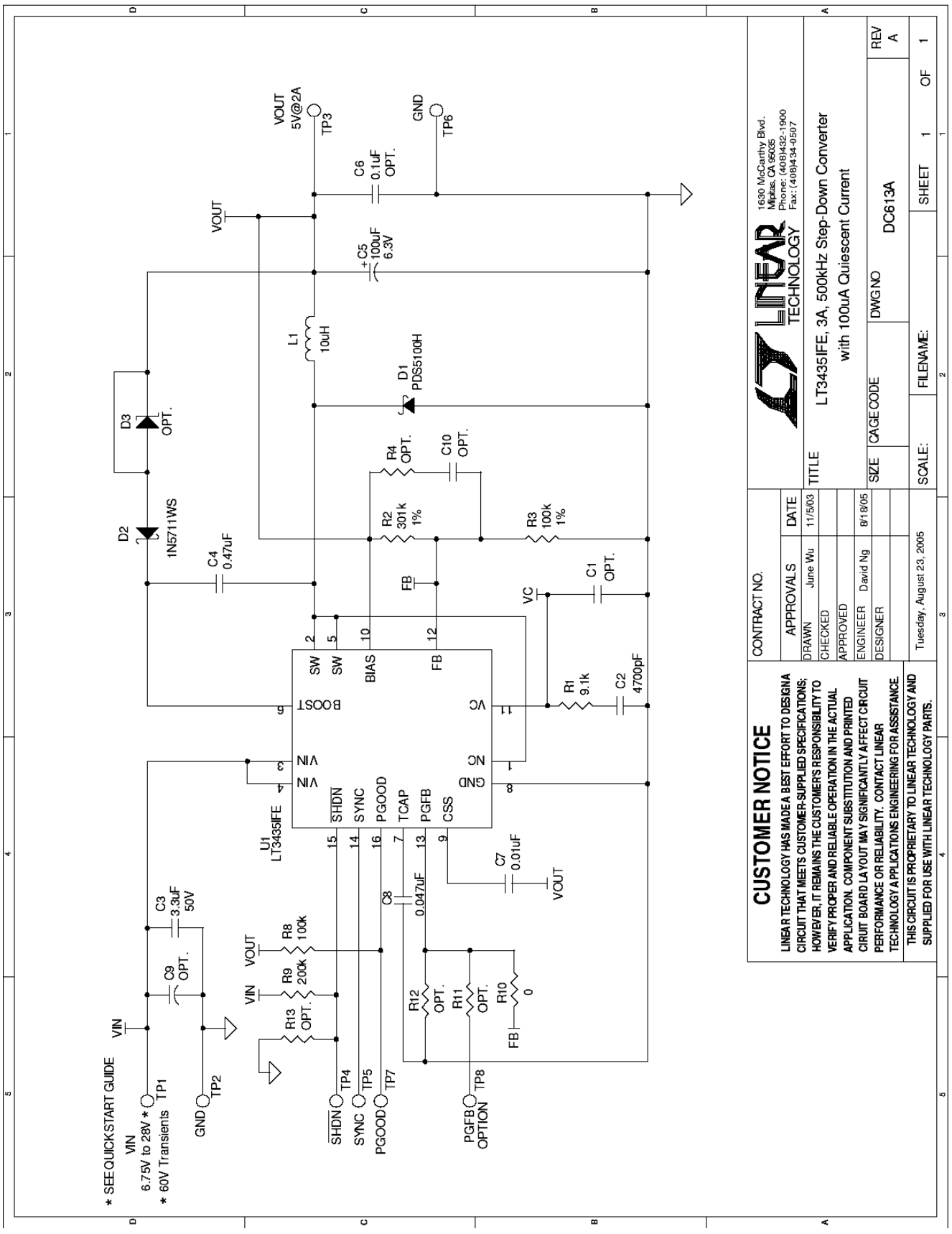


Figure 2. Measuring Input or Output Ripple


* SEE QUICKSTART GUIDE
VIN
6.75V to 28V *
* 60V Transients
TP1
TP2
C3 3.3uF 50V
C9 OPT.
R8 100k
R9 200k
R13 OPT.
C8 0.047uF
R12 OPT.
R11 OPT.
R10 0
C7 0.01uF
U1 LT3435IFE
BOOST
VIN
VIN
SHDN
SYNC
PGOOD
TCAP
PGFB
CSS
SW
SW
BIAS
FB
VC
NC
GND
TP4
TP5
TP7
TP8
SHDN
SYNC
PGOOD
PGFB OPTION
D2 1N5711WS
D3 OPT.
C4 0.47uF
L1 10uH
D1 PDS5100H
R4 OPT.
C10 OPT.
R2 301k 1%
R3 100K 1%
C1 OPT.
R1 9.1k
C2 4700pF
C5 100uF 6.3V
C6 0.1uF OPT.
VOUT 5V@2A
TP3
GND
TP6
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 CIRUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRUIT 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.
CONTRACT NO.
APPROVALS DATE
DRAWN June Wu 11/5/03
CHECKED
APPROVED
ENGINEER David Ng 8/19/05
DESIGNER
SCALE:
Tuesday, August 23, 2005
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TITLE
LT3435IFE, 3A, 500kHz Step-Down Converter
with 100uA Quiescent Current
SIZE CAGE CODE DWG NO DC613A REV A
FILENAME:
SHEET 1 OF 1