

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1260A-A/1260A-B 2A SYNCHRONOUS STEP-UP DC/DC CONVERTER LTC3539/3539-2

## DESCRIPTION

Demonstration circuits 1260A-A and 1260A-B are high efficiency synchronous boost converters capable of operating with an input voltage range from 0.7V to 5.5V. The 2X3 mm DFN thermally enhanced package with a 1MHz switching frequency (2MHz for the -2 part) and the 2A internal switches provide a very tiny overall solution. The LTC3539/LTC3539-2 also feature output disconnect, selectable PWM or BURST mode operation, Shutdown capability and the input voltage can be greater or less than the output voltage.

This demonstration circuit allows the user to quickly evaluate the LTC3528 performance. Jumpers are provided for selecting several regulated output voltages,

and jumpers for low quiescent current shutdown and PWM/BURST mode. Terminals on the board allow easy hookup to an input supply and output load.

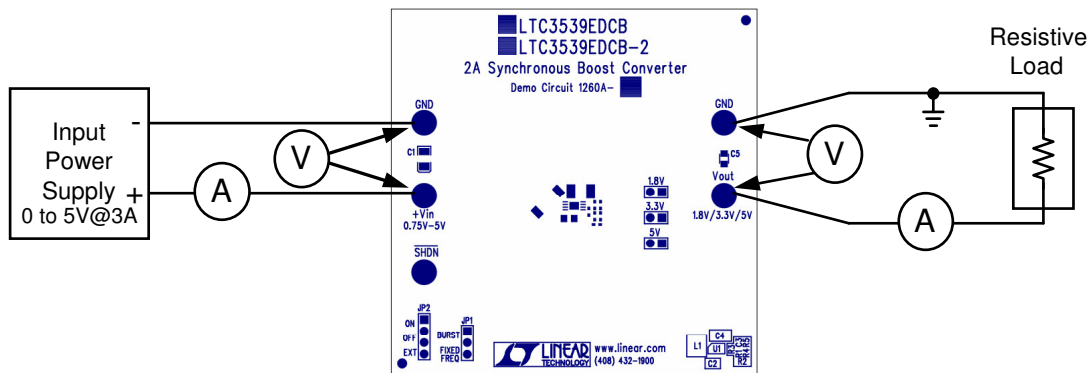
When Burst mode is selected, the converters automatically enter low quiescent current Burst-Mode operation at low current levels, and return to fixed frequency PWM operation at higher current levels. In PWM mode, the converter operates continuously in fixed frequency.

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

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**Table 1. Typical Specifications (25°C)**

$V_{IN}$ , Input Start-up Voltage		650mV
$V_{IN}$ , Input Voltage Range (after start-up)		0.5V to 5V
1.8V $V_{OUT}$	$V_{IN} = 1V, I_{OUT} = 100mA$	$1.8V \pm 2.5\%$
3.3V $V_{OUT}$	$V_{IN} = 1.5V, I_{OUT} = 200mA$	$3.3V \pm 2.5\%$
5V $V_{OUT}$	$V_{IN} = 1.5V, I_{OUT} = 200mA$	$5.0V \pm 2.5\%$
Output Ripple Voltage (burst mode)	$V_{IN} = 1.5V, V_{OUT} = 3.3V, I_{OUT} = 3mA$	8mV p-p
Output Ripple Voltage (fixed frequency)	$V_{IN} = 1.5V, V_{OUT} = 3.3V, I_{OUT} = 300mA$	15mV p-p
Efficiency	$V_{IN} = 1.8V, V_{OUT} = 3.3V, I_{OUT} = 100mA$	90%



**Figure 1. Demonstration Circuit Test Setup**

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1260A-A/1260A-B

## 2A SYNCHRONOUS STEP-UP DC/DC CONVERTER

Demo #	Part #	Part Marking	Frequency
1260A-A	LTC3539EDCB	LDCS	1 MHz
1260A-B	LTC3539EDCB-2	LDPH	2 MHz

Table 1. Demonstration Circuit Board Information

## QUICK START PROCEDURE

There is one demonstration circuit board for both LTC3539 versions. The boards are identified by the handwritten information on the top of the pc board.

The boost converter can be evaluated using the setup shown in Figure 1. Select one of the three output voltages using the voltage select jumpers. (With no jumper installed, the output voltage is 5V.) With jumper JP2 in the ON position and JP1 in BURST, connect voltmeters and ammeters as shown on the test setup. Connect a power supply to the  $+V_{IN}$  and GND terminals and a suitable load resistor between VOUT and GND.

With a light load (1k resistor) at the output, begin increasing the input power supply voltage. At approximately 650mV, the output will rise to the selected regulated voltage. When the output voltage exceeds the input voltage by at least 240mV, the converter powers itself from the output instead of the input. This feature allows the input voltage to drop as low as 500mV (at light loads) and still maintain a regulated output voltage.

Increase the input voltage to approximately 1.5V and increase the load current. The maximum load current depends on the input and output voltage settings. Refer to the data sheet curves for typical output current for various input/output voltages.

The input voltage can exceed the output voltage and still maintain regulation, although the load current is less and efficiency is lower. It should be noted that

the output voltage ripple will increase as  $V_{in}$  approaches  $V_{out}$ . The increase will occur in a narrow range when  $V_{in}$  is between 100 and 300mV below  $V_{out}$ . The ripple voltage in this range can be from 30mV to 100mV pp.

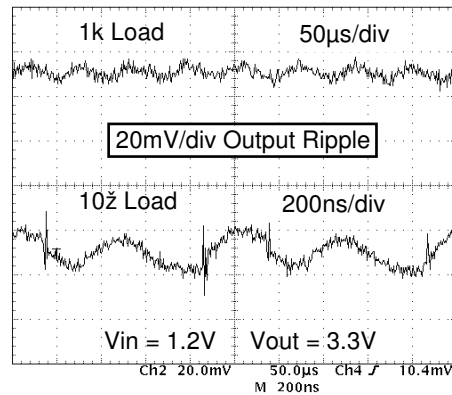
When evaluating the circuit at very low input voltages, it is important to monitor the input voltage directly at the input terminals of the circuit board. At these low input voltages, any voltage drop in the power supply wire, connections and Ammeter will result in the input voltage at the input terminals dropping below the minimum voltage required for operation.

Additional pc board pads are provided for an optional input bypass capacitor (C1). It maybe necessary when using long wires between the power supply and circuit board, or for adding a tantalum capacitor to minimize input voltage transients that may occur when the input is hot-switched. Additional pads directly above the output capacitor (C4) are provided if additional output capacitance is needed.

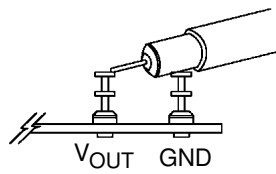
When verifying output ripple, it is important to use the scope probe connection as shown in figure 3. Typical output voltage ripple with a 1k and 100-Ohm load are shown in figure 2. The 1k load shows Burst mode ripple, while the 100 Ohm load is fixed frequency PWM mode.

See [LTC3539/3539-2 Data Sheet](#) for additional information

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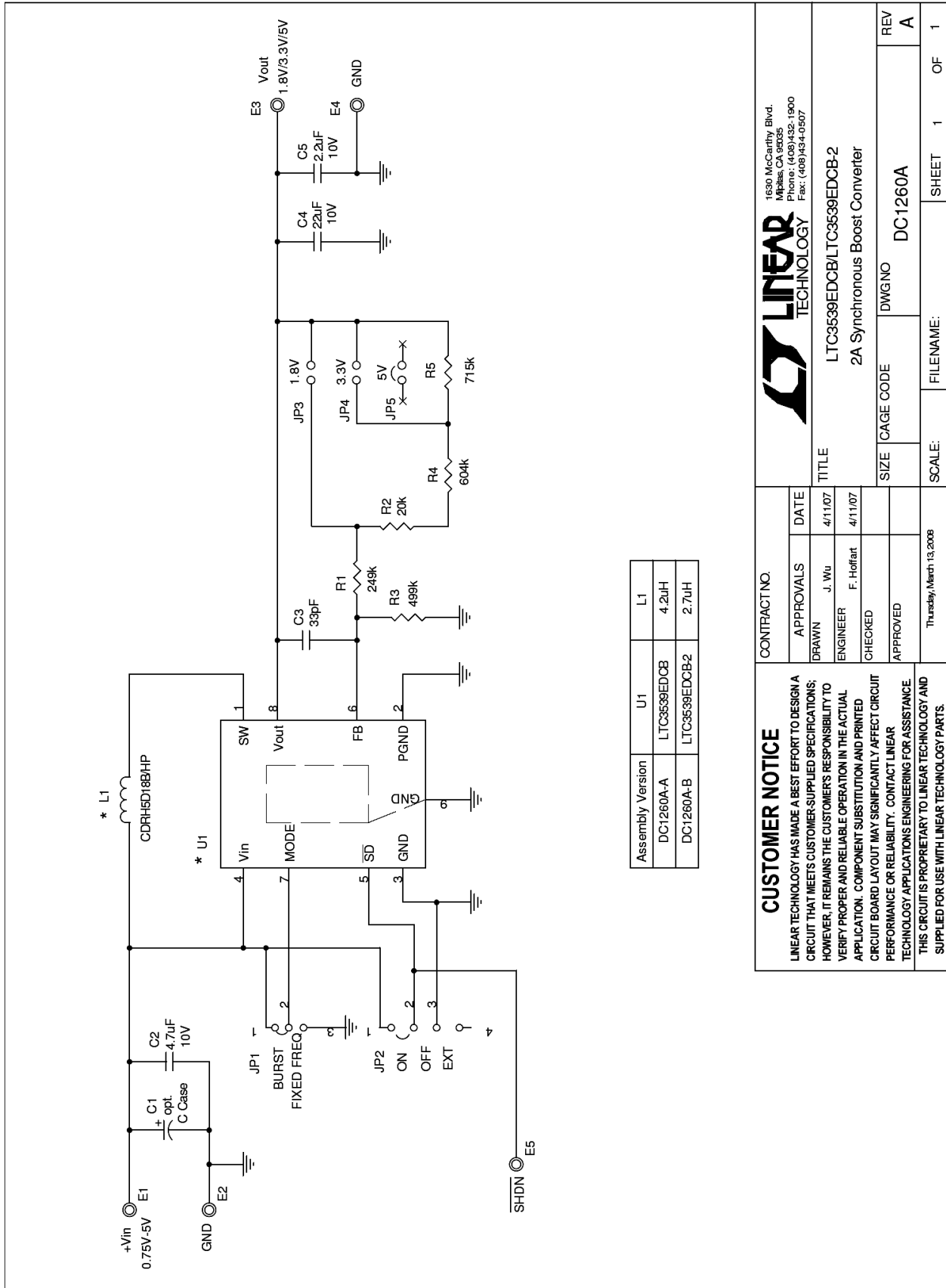


**Figure 2. Typical Output Ripple Voltage (upper – Burst, lower – fixed frequency PWM)**



**Figure 3. Scope Probe Placement for Measuring Output Ripple Voltage**

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Assembly Version	U1	L1
DC1260A-A	LTC3539EDCB	4.2uH
DC1260A-B	LTC3539EDCB-2	2.7uH

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 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.

CONTRACT NO.		APPROVALS	DATE
DRAWN		J. Wu	4/11/07
ENGINEER		F. Hoffart	4/11/07
CHECKED			
APPROVED			
Thursday, March 13, 2008			

TITLE		SIZE	CAGE CODE	DWG NO	REV
LTC3539EDCB/LTC3539EDCB-2				DC1260A	A
2A Synchronous Boost Converter					
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