DESCRIPTION

Demonstration circuit 1483 is a dual high efficiency synchronous boost converter capable of operating with an input voltage range from 0.8V to 5V. The 12 lead 3X3 mm thermally enhanced DFN package with a 1MHz switching frequency and the 550mA internal switches provide a very tiny step-up solution. The LTC3535 can be powered from separate input supplies that can be greater or less than the output voltage although the efficiency and maximum output current is reduced when V_{IN} is greater than V_{OUT}. Also featured is burst mode operation for high efficiency at low current levels and a true input-to-output disconnect which allows the output to drop to zero volts when shutdown and provides soft start and current limiting.

This demonstration circuit allows the user to quickly evaluate the LTC3535 performance. Individual jumpers are provided for selecting a variety of output voltages from 1.8V to 5V. Jumpers also allow separate low quiescent current shutdown and the ability to parallel the inputs. Terminals on the board allow easy hookup to input supplies and output loads.

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

LTC and Burst Mode are trademarks of Linear Technology Corporation

Table 1. Each Converter Typical Specifications (25°C)

V_{IN} Input Voltage Range after startup	Minimum voltage is load current dependant	0.5V to 5V
V_{OUT1} 3V	V_{IN} = 1.5V, I_{OUT} = 100mA	3V ± 3%
V_{OUT1} 3.3V	V_{IN} = 1.5V, I_{OUT} = 100mA	3.3V ± 3%
V_{OUT1} 5V	V_{IN} = 1.5V, I_{OUT} = 100mA	5.0V ± 3%
V_{OUT2} 1.8V	V_{IN} = 1.5V, I_{OUT} = 100mA	1.8V ± 3%
V_{OUT2} 2.85V	V_{IN} = 1.5V, I_{OUT} = 100mA	2.85V ± 3%
V_{OUT2} 3.3V	V_{IN} = 1.5V, I_{OUT} = 100mA	3.3V ± 3%
Output Ripple Voltage (burst mode)	V_{IN} = 1.2V, V_{OUT} = 3.3V I_{OUT} = 10mA	45mV p-p
Output Ripple Voltage (fixed frequency)	V_{IN} = 1.2V, V_{OUT} = 3.3V I_{OUT} = 100mA	15mV p-p
Efficiency	V_{IN} = 1.2V, V_{OUT} = 1.8V I_{OUT} = 10mA	84%
Efficiency	V_{IN} = 1.8V, V_{OUT} = 3.3V I_{OUT} = 100mA	88%

QUICK START PROCEDURE

The boost converters can be evaluated using the setup shown in Figure 1. Set jumper JP1 to the PARALLEL position and JP2 and JP3 to ON. Select the desired output voltages using jumpers JP4 and JP5. (With no jumpers installed, the output voltage is set for the maximum). Connect voltmeters and ammeters as shown on the test setup. Connect a power supply to the V_{IN} and GND terminals and suitable load resistors between VOUT and GND.

With a light load (1k resistor) at one of the outputs, begin increasing the input power supply voltage. At approximately 800mV, the output will rise to the selected regulated voltage. Increase the input voltage to approximately 1.5V and increase the load current.

Note the excellent load regulation when going from a light load current to a heavier load, but it is important to monitor the input voltage directly at the input terminals of the circuit board. At very low input voltages, voltage drops 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 optional input bypass capacitors (C1, C3). These may be necessary when using long wires between the power supply and circuit board, or for adding tantalum capacitors to minimize input voltage transients that may occur when the input is hot-switched. Also, pads on the board backside are provided for adding small Schottky diodes, which can increase efficiency slightly under some conditions. But adding a diode defeats the output disconnect and short circuit protection features.

When verifying output ripple use the scope probe connection as shown in figure 2.

In Burst mode with light load current, the output ripple voltage is higher than in non-burst mode.

See the LTC3535 Data Sheet for additional data.

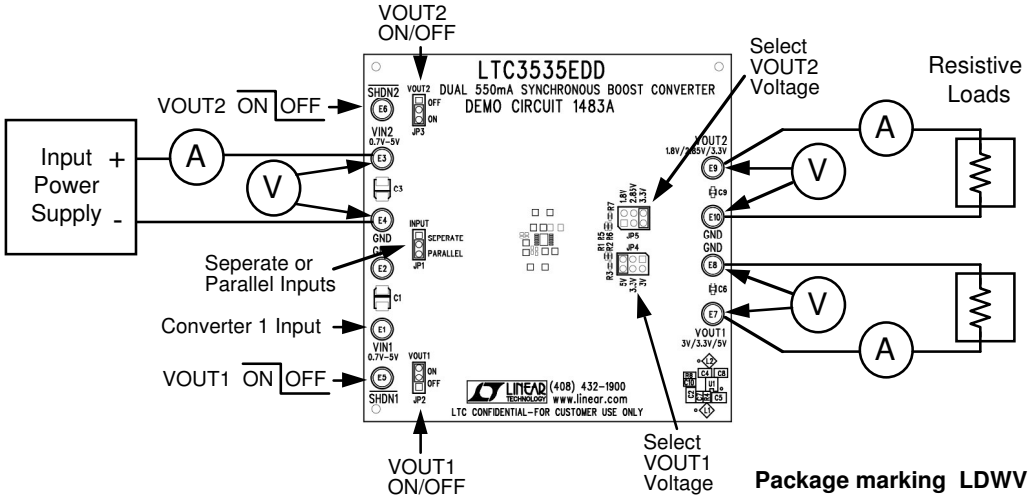


Figure 1. Demonstration Circuit Test Setup

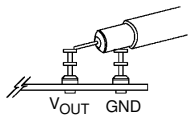
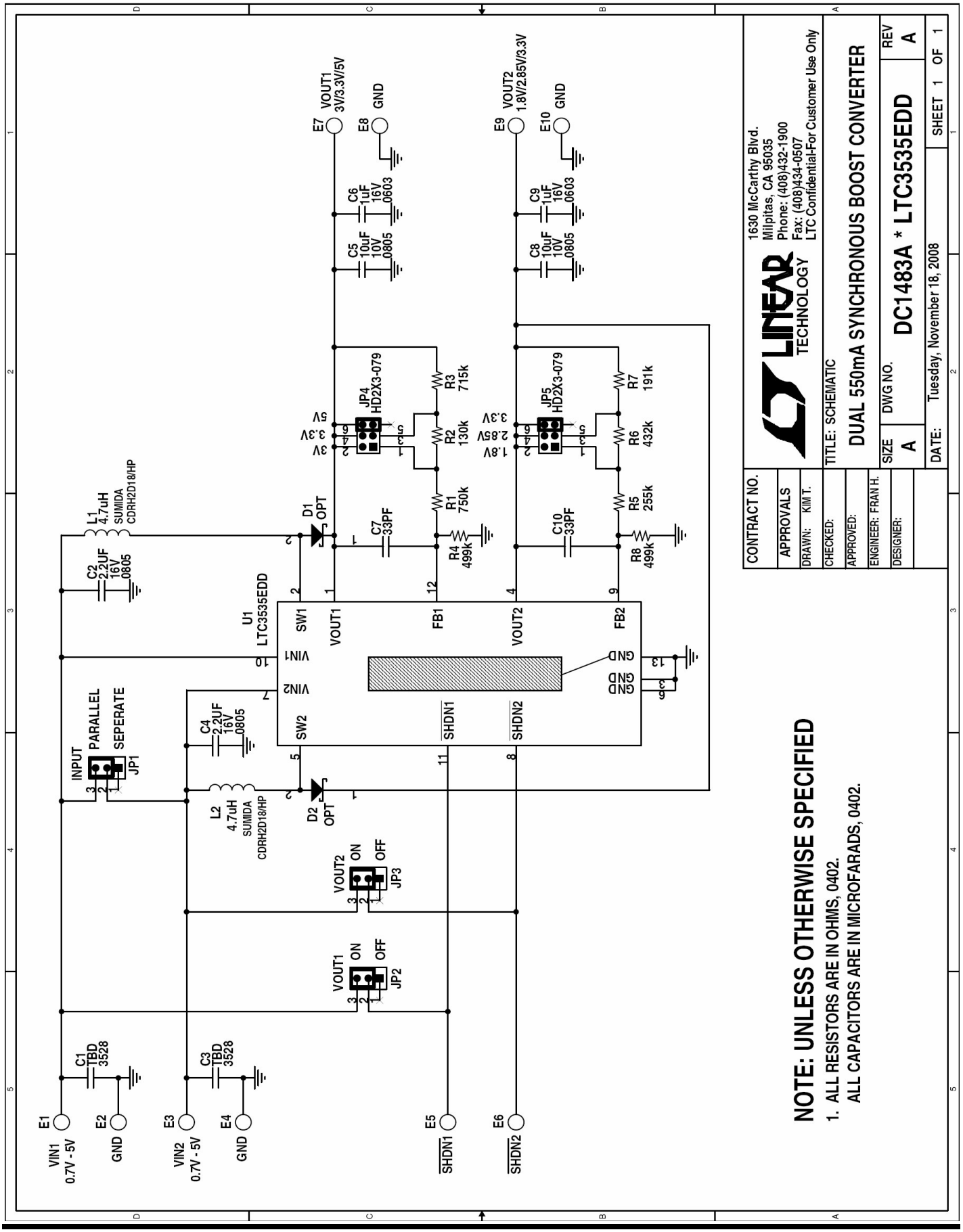


Figure 2. Scope Probe Placement for Measuring Output Ripple Voltage.


NOTE: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE IN MICROFARADS, 0402.
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
LTC Confidential-For Customer Use Only
CONTRACT NO.
APPROVALS
DRAWN: KIM T.
CHECKED:
APPROVED:
ENGINEER: FRAN H.
DESIGNER:
TITLE: SCHEMATIC
DUAL 550mA SYNCHRONOUS BOOST CONVERTER
SIZE A
DWG NO. DC1483A * LTC3535EDD
REV A
DATE: Tuesday, November 18, 2008
SHEET 1 OF 1
U1 LTC3535EDD
VIN1
VIN2
SW1
SW2
VOUT1
VOUT2
FB1
FB2
SHDN1
SHDN2
GND
L1 4.7uH SUMIDA CDRH2D18/HP
L2 4.7uH SUMIDA CDRH2D18/HP
D1 OPT
D2 OPT
C1 TBD 3528
C2 2.2UF 16V 0805
C3 TBD 3528
C4 2.2UF 16V 0805
C5 10uF 10V 0805
C6 1uF 16V 0603
C7 33PF
C8 10uF 10V 0805
C9 1uF 16V 0603
C10 33PF
R1 750k
R2 130k
R3 715k
R4 499k
R5 255k
R6 432k
R7 191k
R8 499k
JP1 INPUT PARALLEL SEPERATE
JP2 VOUT1 ON OFF
JP3 VOUT2 ON OFF
JP4 HD2X3-079 5V 3.3V 3V
JP5 HD2X3-079 3.3V 2.85V 1.8V
E1 VIN1 0.7V - 5V
E2 GND
E3 VIN2 0.7V - 5V
E4 GND
E5 SHDN1
E6 SHDN2
E7 VOUT1 3V/3.3V/5V
E8 GND
E9 VOUT2 1.8V/2.85V/3.3V
E10 GND