

## Constant-Current/ Constant-Voltage 1.4MHz Step-Up DC/DC Converter

### DESCRIPTION

Demonstration circuit 780B is a Constant-Current Constant-Voltage 1.4MHz Step-up DC/DC Converter featuring the [LT<sup>®</sup>1618](#). DC780B demonstrates a general purpose Boost converter with a 12V, 250mA output from a 3.3V-4.2V source.

The demo board can also be used as an LED driver, where a Luxeon LED (not installed), is driven with a regulated current of 500mA (default current), at a forward voltage of 3.5V. By changing the value of R4 to 2.2M the LED current can be regulated at 250mA.

The LT1618 can be used for wider input voltages, but output voltage level and component selection restrict this demo circuit to Lithium Ion battery input levels.

The LT1618 contains a unique current feedback loop that allows for accurate regulation of either input or output current, whether in Boost, or SEPIC topology.

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 DC780B.

**Design files for this circuit board are available at <http://www.linear.com/demo/DC780B>**

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### PERFORMANCE SUMMARY (T<sub>A</sub> = 25°C)

| SYMBOL              | PARAMETER            | CONDITIONS                                        | MIN   | TYP | MAX   | UNITS |
|---------------------|----------------------|---------------------------------------------------|-------|-----|-------|-------|
| V <sub>IN</sub>     | Input Supply Range   |                                                   | 3.3   |     | 4.2   | V     |
| V <sub>OUT</sub>    | Output Voltage Range | V <sub>IN</sub> = 3.3V, I <sub>LOAD</sub> = 250mA | 11.64 | 12  | 12.36 | V     |
| Ripple              |                      | V <sub>IN</sub> = 3.3V, I <sub>LOAD</sub> = 250mA |       | 100 |       | mV    |
| Efficiency          |                      | V <sub>IN</sub> = 4.2V, I <sub>LOAD</sub> = 250mA |       | 83  |       | %     |
| Switching Frequency |                      |                                                   |       | 1.4 |       | MHz   |

## QUICK START PROCEDURE

Demo circuit 780B is easy to set up to evaluate the performance of the LT1618. 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  $V_{IN}$  or  $V_{OUT}$  and GND terminals. See Figure 3 for proper scope probe technique.

1. With power off, connect the input power supply to  $V_{IN}$  and GND.

2. Turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed 4.2V.

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.

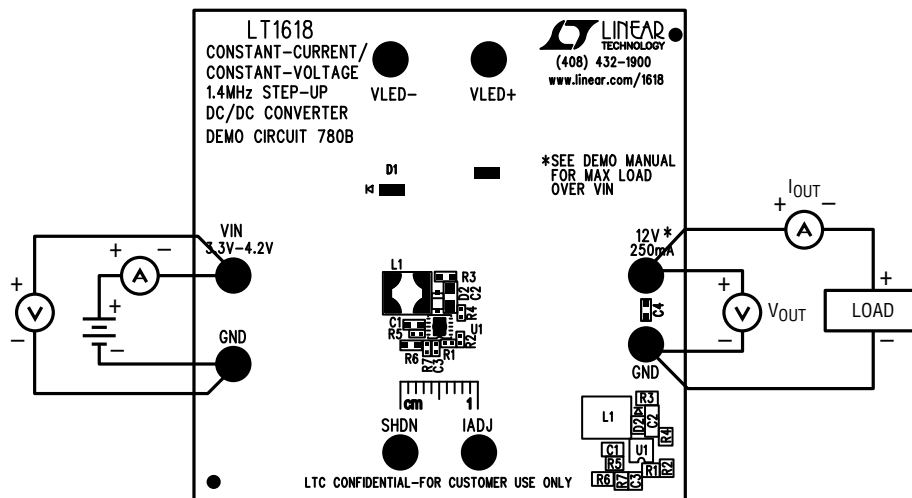


Figure 1. DC780B Proper Equipment Setup

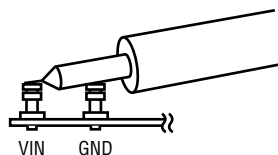


Figure 2. Measuring Input or Output Ripple

## OPTIONAL FUNCTIONS

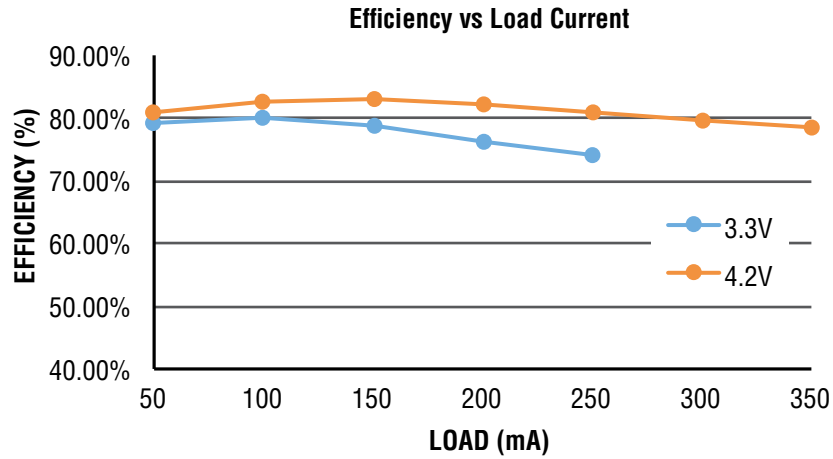


Figure 3. Efficiency vs Load Current

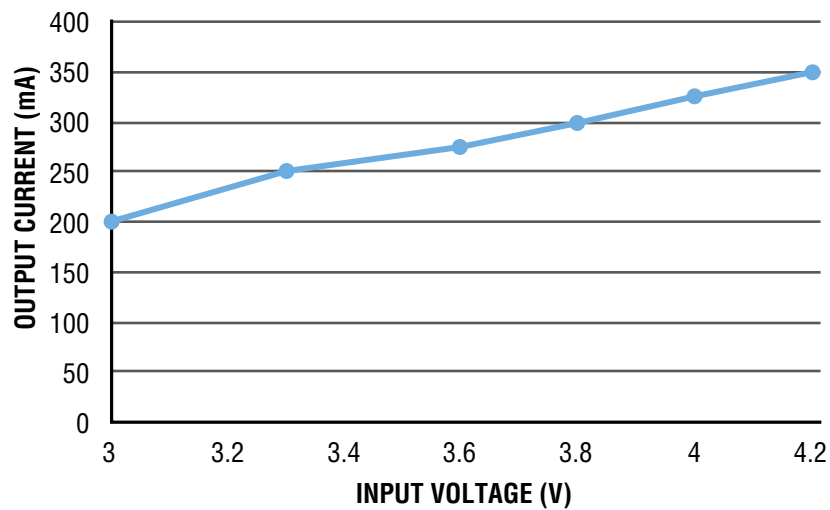


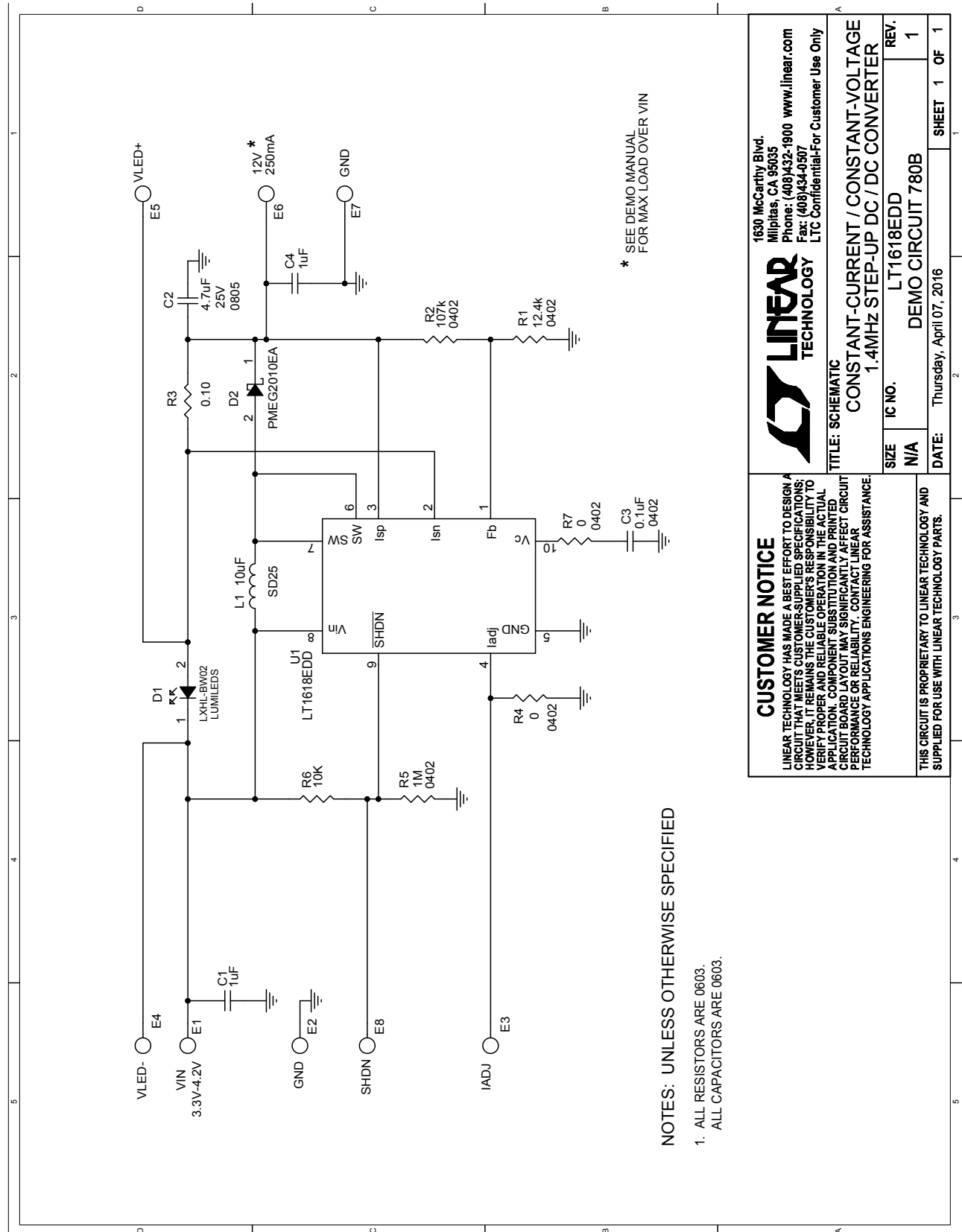
Figure 4. Output Current vs Input Voltage

# DEMO MANUAL DC780B

## PARTS LIST

| ITEM                                             | QTY | REFERENCE | PART DESCRIPTION                      | MANUFACTURER/PART NUMBER    |
|--------------------------------------------------|-----|-----------|---------------------------------------|-----------------------------|
| <b>Required Circuit Components</b>               |     |           |                                       |                             |
| 1                                                | 1   | C1        | CAP, X5R, 1 $\mu$ F, 10V, 20%, 0603   | AVX, 0603ZD105MAT2A         |
| 2                                                | 1   | C2        | CAP, X7R, 4.7 $\mu$ F, 25V, 10%, 0805 | MURATA, GRM21BR71E475KA73L  |
| 3                                                | 1   | C3        | CAP, X5R, 0.1mF, 10V, 10%, 0402       | MURATA, GRM155R61A104KA01D  |
| 4                                                | 1   | C4        | CAP, X7R, 1 $\mu$ F, 25V, 10%, 0603   | MURATA, GRM188R71E105KA12D  |
| 5                                                | 1   | D2        | DIODE, SCHOTTKY, 20V, 1A              | NXP, PMEG2010EA,115         |
| 6                                                | 1   | L1        | IND., 10 $\mu$ H                      | COOPER BUSSMANN, SD25-100-R |
| 7                                                | 1   | R1        | RES, 12.4k, 1%, 1/16W, 0402           | VISHAY, CRCW040212K4FKED    |
| 8                                                | 1   | R2        | RES, 107k, 1%, 1/16W, 0402            | VISHAY, CRCW0402107KFKED    |
| 9                                                | 1   | R3        | RES, 0.10, 1%, 1/16W, 0603, SENSE     | VISHAY, WSL0603R0100FEA     |
| 10                                               | 2   | R4, R7    | RES, 0, 1/16W, 0402                   | VISHAY, CRCW04020000Z0ED    |
| 11                                               | 1   | R5        | RES, 1M, 5%, 1/16W, 0402              | VISHAY, CRCW04021M00JNED    |
| 12                                               | 1   | R6        | RES, 10k, 1%, 1/16W, 0402             | VISHAY, CRCW040210K0FKED    |
| 13                                               | 1   | U1        | IC, LT1618EDD                         | LINEAR TECH. LT1618EDD#PBF  |
| <b>Additional Demo Board Circuit Components</b>  |     |           |                                       |                             |
| 1                                                | 0   | D1 (OPT)  | LED, OPTION, LXHL-BW02                |                             |
| <b>Hardware/Components (For Demo Board Only)</b> |     |           |                                       |                             |
| 1                                                | 8   | E1-E8     | TURRETS                               | MILL-MAX-2501-2             |

## SCHEMATIC DIAGRAM



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TITLE: SCHEMATIC

CONSTANT-CURRENT / CONSTANT-VOLTAGE  
1.4MHz STEP-UP DC / DC CONVERTER

|       |                          |              |
|-------|--------------------------|--------------|
| SIZE  | IC NO.                   | REV.         |
| N/A   | LT1618EDD                | 1            |
| DATE: | Thursday, April 07, 2016 | SHEET 1 OF 1 |

# DEMO MANUAL DC780B

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