

DESCRIPTION

Demonstration Circuit 1279 is a full-featured LED driver with 1.5A switch current featuring the LT[®]3518. The board is optimized to drive a 330mA LED string with a total LED voltage between the input voltage and 40V in a boost topology. The high input voltage range, high-efficiency low-side internal 1.5A npn power switch, low voltage floating current sense amplifier, soft-start, high-side PMOS PWM gate driver, high pwm dimming ratio, overvoltage protection, shutdown control pin, analog LED current dimming control, and externally programmable switching frequency (with sync) make the LT3517 an extremely versatile and powerful LED driving IC.

The LT3517 has a 45V switch with 1.5A peak switch current limit rating. DC1279 has overvoltage protection at 41V if the LEDs are open or not properly attached to the terminals on the PCB. The shutdown function is activated by pulling the shutdown terminal to ground. In shutdown the boost configuration allows the input voltage to be seen on the output and if the attached LED array leaks current at the input voltage and the topside PWM FET is not used, the LEDs may not completely turn off in shutdown. If the topside PWM FET is installed and tied to the TG pin, it will provide shutdown output disconnect and the LEDs will turn off during shutdown. The CTRL terminal can be used to analog dim the LED current. In order to use the CTRL terminal, R6 (zero ohm) pull-up short resistor must be removed and replaced with a re-

sistor divider from Vref to GND or an external voltage on the CTRL terminal.

The high-side PMOS PWM dimming MOSFET can be used to achieve 3000:1 PWM dimming ratio. The board is programmed for 1MHz oscillator frequency, but can be adjusted by changing the R14. Higher switching frequency results in higher PWM dimming ratio.

The VIN pin can be tied directly to PVIN for simplicity or powered from an additional low voltage input such as 3.3V for higher efficiency operation and lower on-chip power dissipation.

A few simple modifications can be made to DC1279 in order to convert the board from a boost LED driver to a buck mode or buck-boost mode LED driver. Please consult the datasheet for schematic details and the factory for customization details.

The LT3517 datasheet gives a complete description of the part, operation and applications information. The datasheet must be read in conjunction with this Quick Start Guide for demonstration circuit 1279. The LT3517 is assembled in a small 16-lead plastic (4mm x 4mm) QFN UF package with a thermally enhanced ground pad. Proper board layout is essential for maximum thermal performance. See the datasheet section 'Layout Considerations'.

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

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QUICK START PROCEDURE

DC1279 is easy to set up to evaluate the performance of the LT3517. Follow the procedure below:

NOTE: Make sure that the PVIN input voltage does not exceed 40V and that the VIN input voltage does not exceed 30V.

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1279

FULL-FEATURED LED DRIVER WITH 1.5A SWITCH CURRENT

1. Connect a string of LEDs with forward voltage less than 40V, but greater than the PVIN input voltage, to the LED+ and GND terminals on the PCB as shown.
2. With power off, connect a 3.3V input power supply to the VIN and GND terminals on the PCB.
3. With power off, connect a 3V to 40V input power supply to PVIN and GND terminals on the PCB. PVIN should not exceed the attached LED string voltage.
4. Connect a 3.3V source to PWM and GND.
5. Turn PVIN power on.
6. Turn VIN power on and observe the regulated LED current, the circuit efficiency, etc. without looking directly at the LEDs.
7. For PWM dimming, tie a 100Hz, 3-5V PWM waveform to the PWM terminal and GND and observe the PWM dimming LED current and PWM gate waveforms.
8. For shutdown, tie the $\overline{\text{SHDN}}$ terminal to GND and observe the LED current dropping to zero and the VIN input current dropping to about 65 μA with R4 installed ($V_{\text{IN}} / 51\text{k}$).

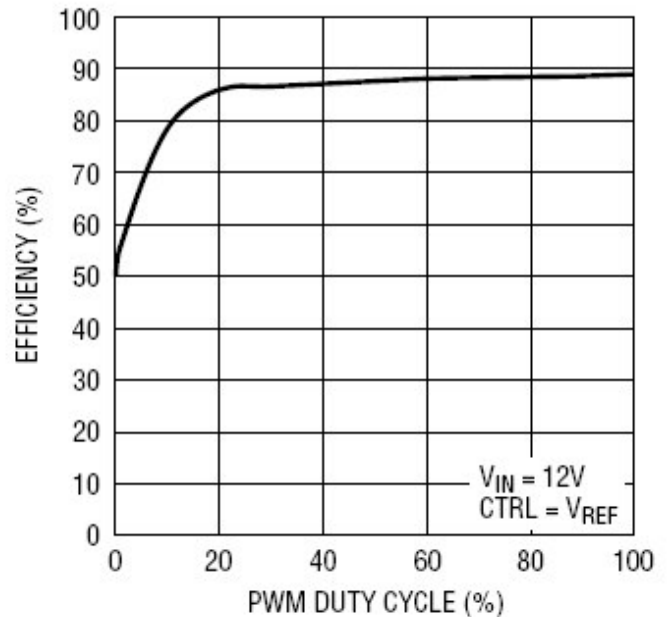


Figure 1. DC1279A Efficiency 30V LED string, PVIN=VIN=12V

3000:1 PWM Dimming at 100Hz



Figure 2. DC1279A 30V LED string PWM Dim, PVIN=12V

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1279

FULL-FEATURED LED DRIVER WITH 1.5A SWITCH CURRENT

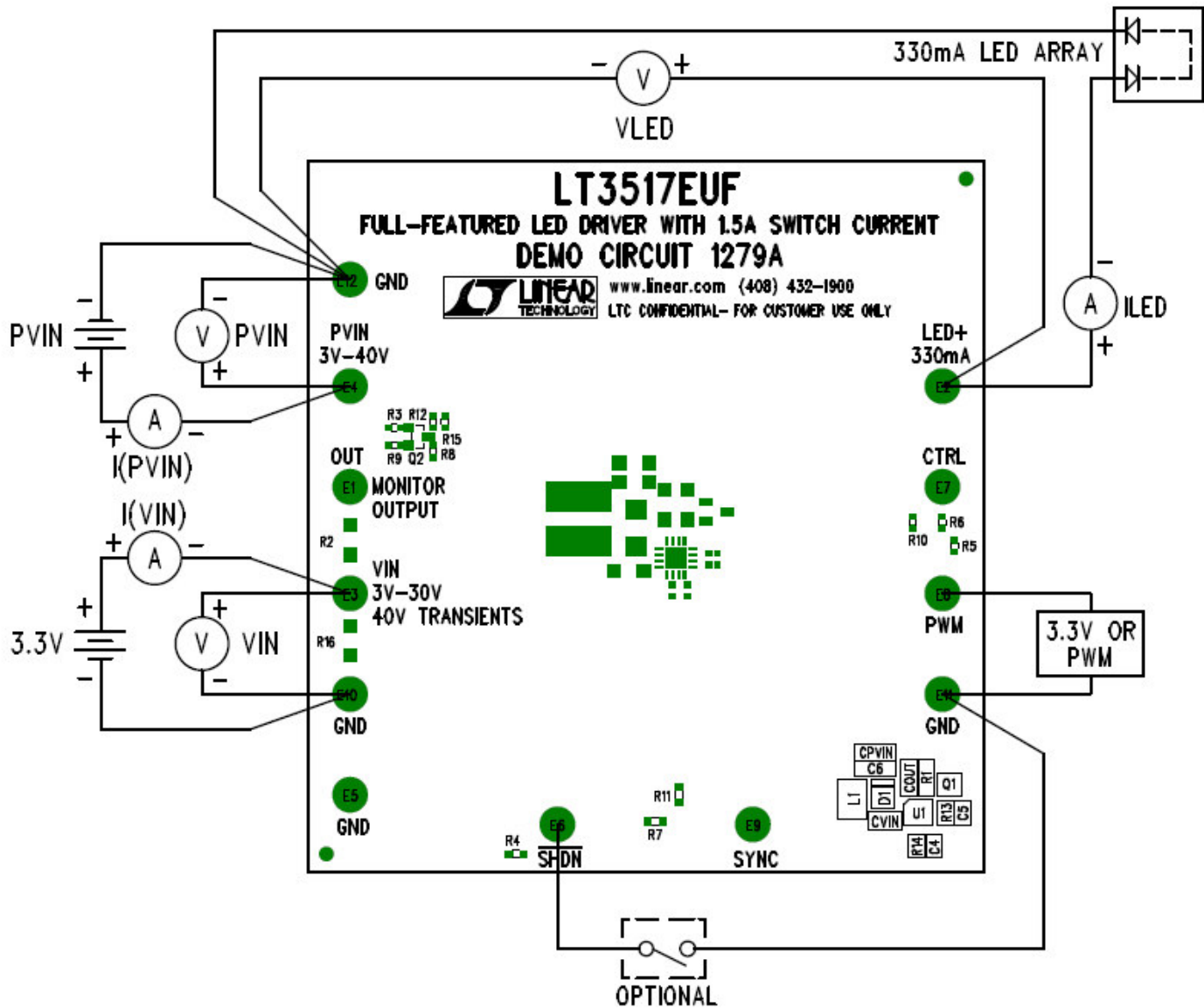
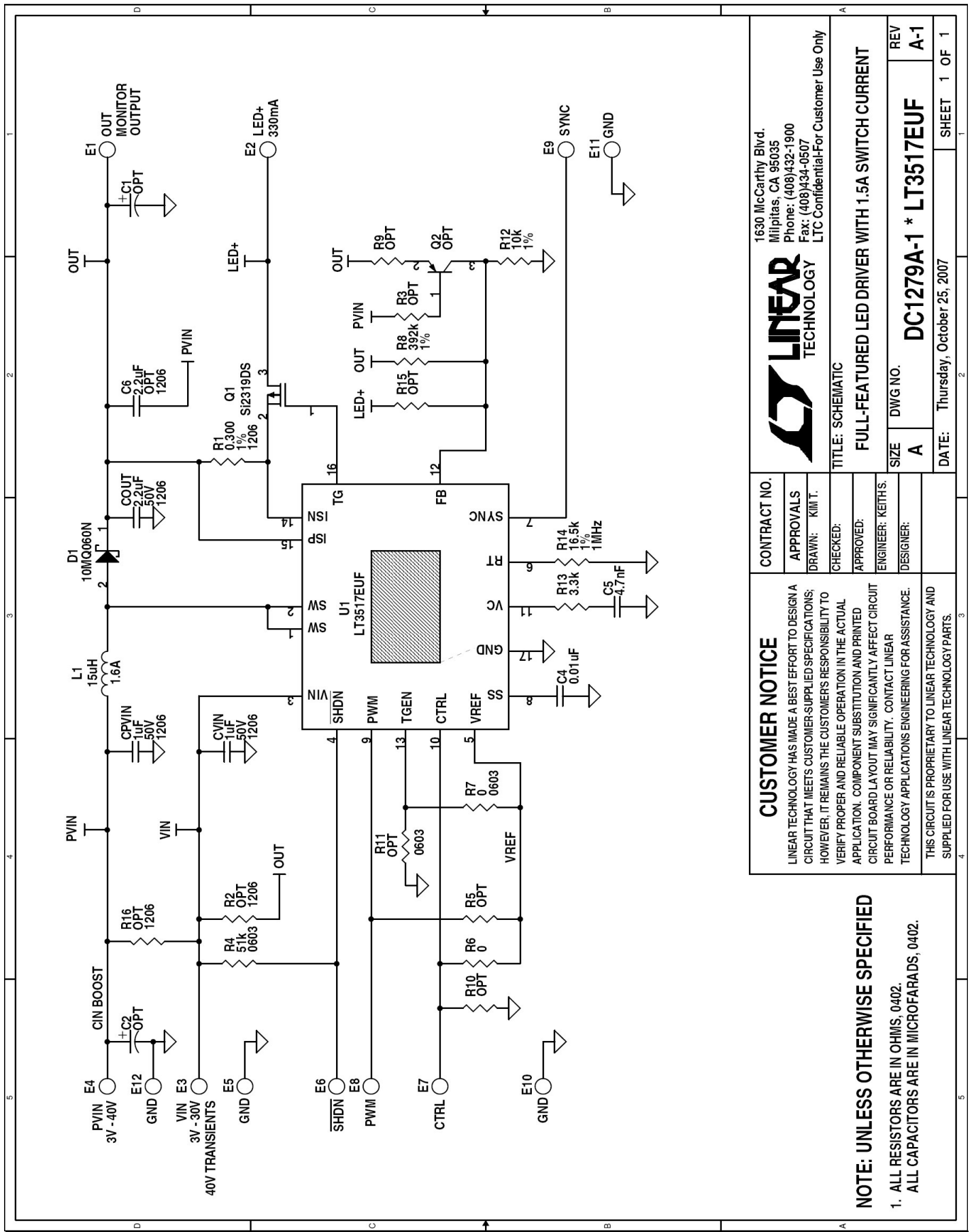


Figure 3. Proper Measurement Equipment Setup

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1279

FULL-FEATURED LED DRIVER WITH 1.5A SWITCH CURRENT



1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
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LINEAR TECHNOLOGY

TITLE: SCHEMATIC
FULL-FEATURED LED DRIVER WITH 1.5A SWITCH CURRENT

SIZE: A
DWG NO.: DC1279A-1 * LT3517EUF
REV: A-1

DATE: Thursday, October 25, 2007
SHEET 1 OF 1

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.

CONTRACT NO.
APPROVALS
DRAWN: KIM T.
CHECKED:
APPROVED:
ENGINEER: KEITH S.
DESIGNER:

NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE IN MICROFARADS, 0402.