DEMO CIRCUIT 976
QUICK START GUIDE

LT3476EUHF
Quadruple High Power LED Driver in Buck Mode

DESCRIPTION

WARNING!

Do not look directly at operating LED.
This circuit produces light that can damage eyes.

Demonstration circuit 976 is a Quadruple High Power LED Driver in Buck Mode featuring the LT3476EUHF. The LT3476 is a quad output DC/DC converter designed to operate as a current source for driving high current LEDs. On the demo circuit, the default current for each output channel is 350mA but that can be adjusted to up to 1.05A via resistor dividers at the VADJ pins. The output current should not exceed the rated current of the LEDs used. If 1W LEDs, such as the Lumileds Luxeon LEDs, are used, 350mA current is the maximum. 1A output current is reserved for 3W LEDs, such as Luxeon III. The LED current thermal de-rating should be considered to protect the LEDs. The maximum LED string voltage the demo circuit can drive is limited by the duty cycle and the input voltage of the LT3476. The demo circuit default switching frequency is 1MHz. At 1MHz, the maximum duty cycle is 84% (MIN). Lower switching frequency results in higher maximum duty cycle. The input voltage is limited by the CAP pin overvoltage protection threshold. As a result, each channel of the demo circuit can drive up to 27V total LED voltage. Adjustable switching frequency allows optimization of the efficiency and the external component size. At 1MHz, 96% efficiency can be achieved at 1A without sacrificing the solution size.

Each of the four regulators on the demo circuit is independently operated. The PWM dimming feature of the LT3476 allows True Color PWM dimming with the dimming ratio up to 1000:1. Additional analog dimming is possible.

The LT3476 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 976.

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

PERFORMANCE SUMMARY **Specifications are at TA = 25°C**

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
PV_{IN}	Power Input Supply				33	V
V_{IN}	Chip Bias Input Supply		2.8		16	V
V_{LED}	Output LED Voltage, per Output	PV_{IN} = 33V, I_{LED} = 350mA			27	V
I_{LED}	Output LED Current, per Output	R2, R25, R27, R29 = 66.5K		350		mA
I_{LED}	Output LED Current, per Output	R2, R25, R27, R29 = 0	1013	1050	1087	mA
F_{SW}	Switching Frequency	R11 = 21K	0.85	1	1.15	MHz
η	Conversion Efficiency	I_{LED} = 350mA		94		%
η	Conversion Efficiency	I_{LED} = 1050mA		96		%
P_{OUT}	Maximum Total Output Power	I_{LED} = 1050mA			100	W
PWM_D	PWM Dimming Ratio	PWM Frequency = 100Hz			1000:1	

QUICK START PROCEDURE

Demonstration circuit 976 is easy to set up to evaluate the performance of the LT3476EUHF. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. With power off, connect an input power supply to VIN and GND. The maximum rating is 16V. To achieve highest efficiency, a low voltage supply, such as 3.3V or 5V, is recommended.

2. With power off, connect a second input power supply to PVIN and GND. The maximum PVIN is 33V.

3. With power off, connect PWM1, PWM2, PWM3, PWM4 to VIN. If an output *n* is not used, the PWM*n* can be left unconnected.

4. With power off, connect a LED (in series) string to an output channel. Connect the anode of the first LED to the LED*n*+. Connect the cathode of the last LED to the LED*n*-. All four channels can operate simultaneously or individually.

5. Turn on PVIN power supply.

6. Turn on VIN power supply.

7. Check for the proper LED current and LED string voltage.

NOTE. If there is no output, turn off the power supplies. Check all connections.

8. Once the proper output current/voltage are established, adjust the parameters within the operating range and observe the output current regulation, efficiency and other parameters.

9. To observe PWM dimming, turn off all power supplies. Disconnect PWM*n* from VIN. Connect PWM*n* to a pulse generator. Then turn on PVIN, the PWM pulse generator and VIN.

10. For even faster LED current turn-off, remove R20, R21, R22, R23 and repeat step 9.

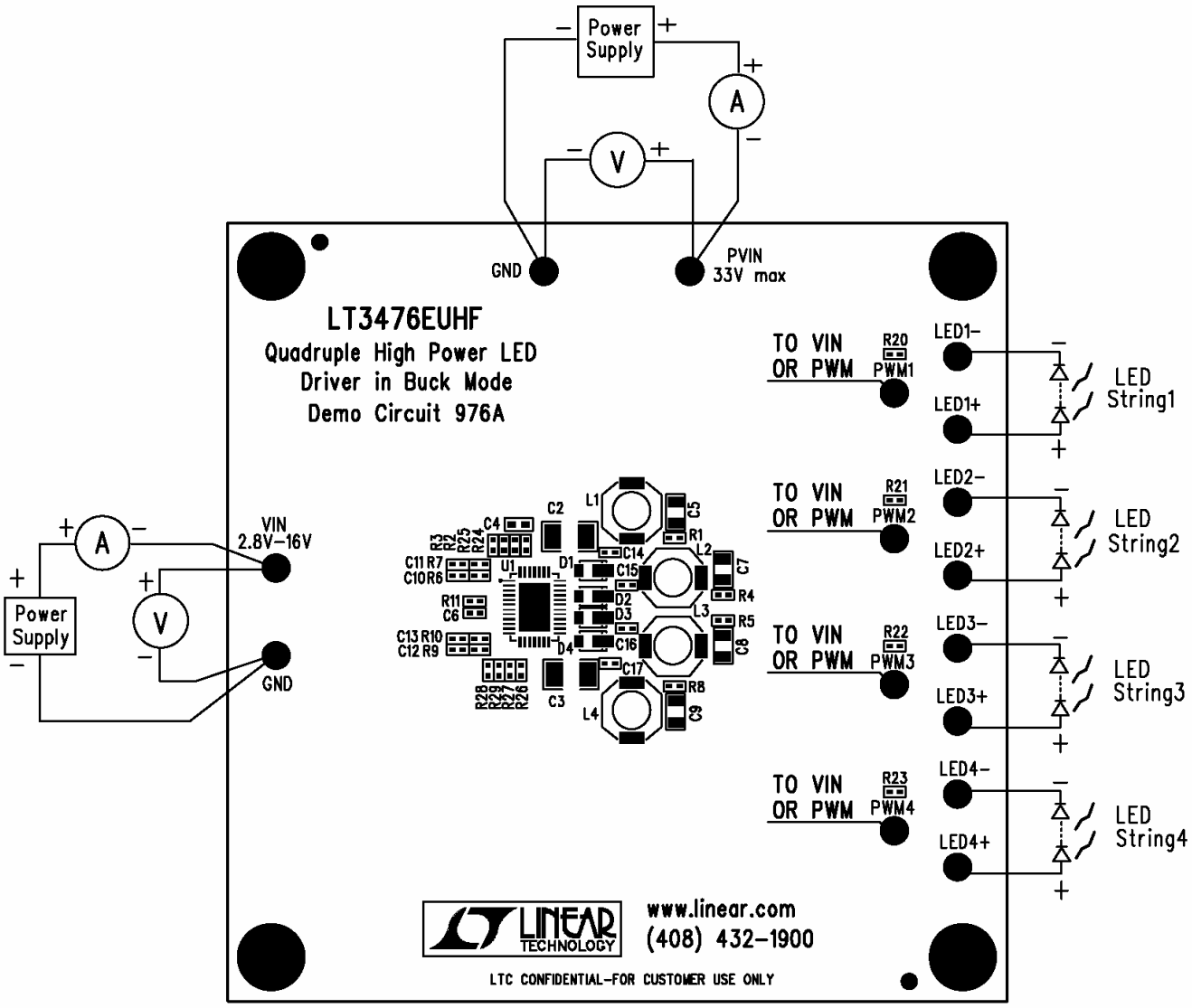
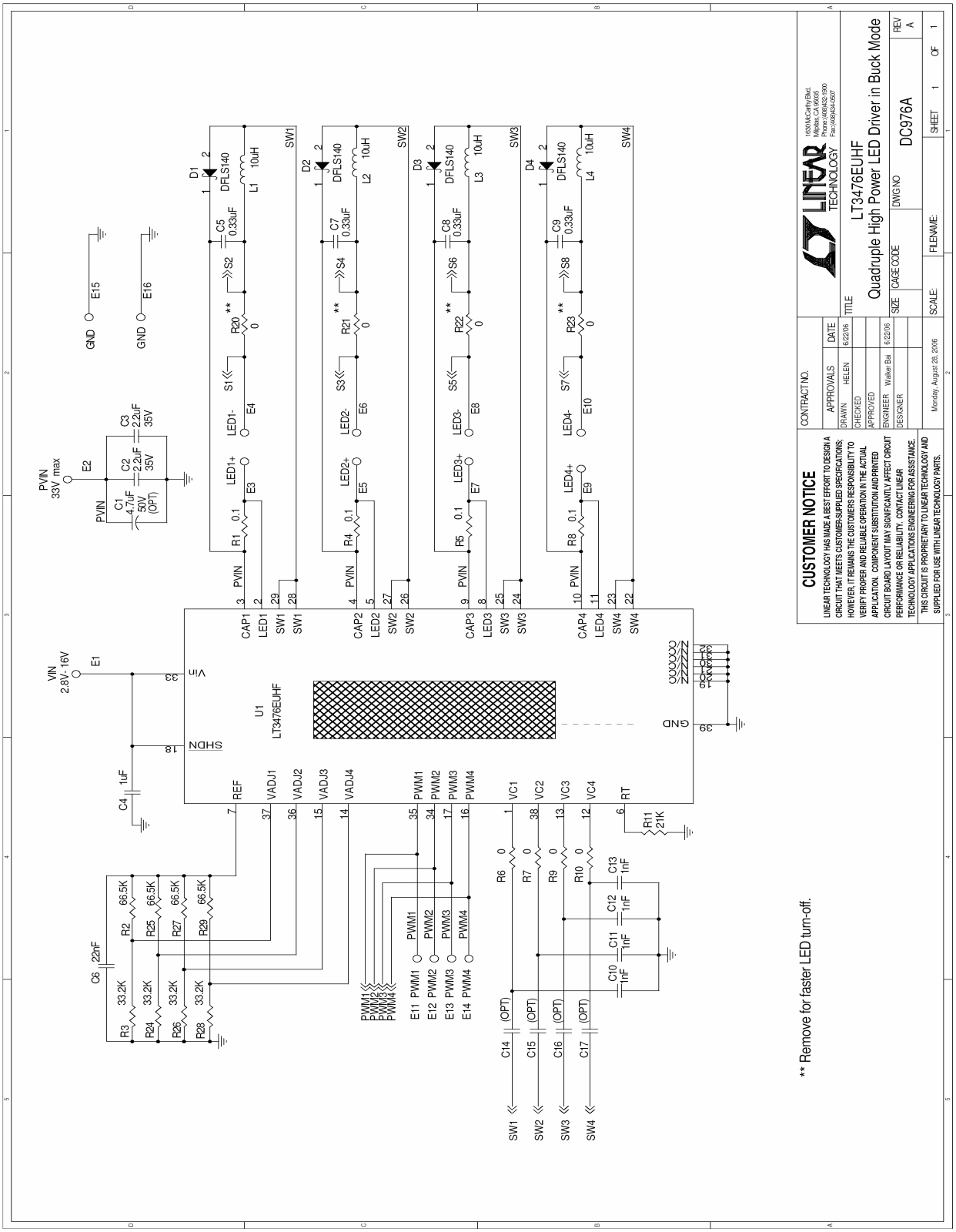
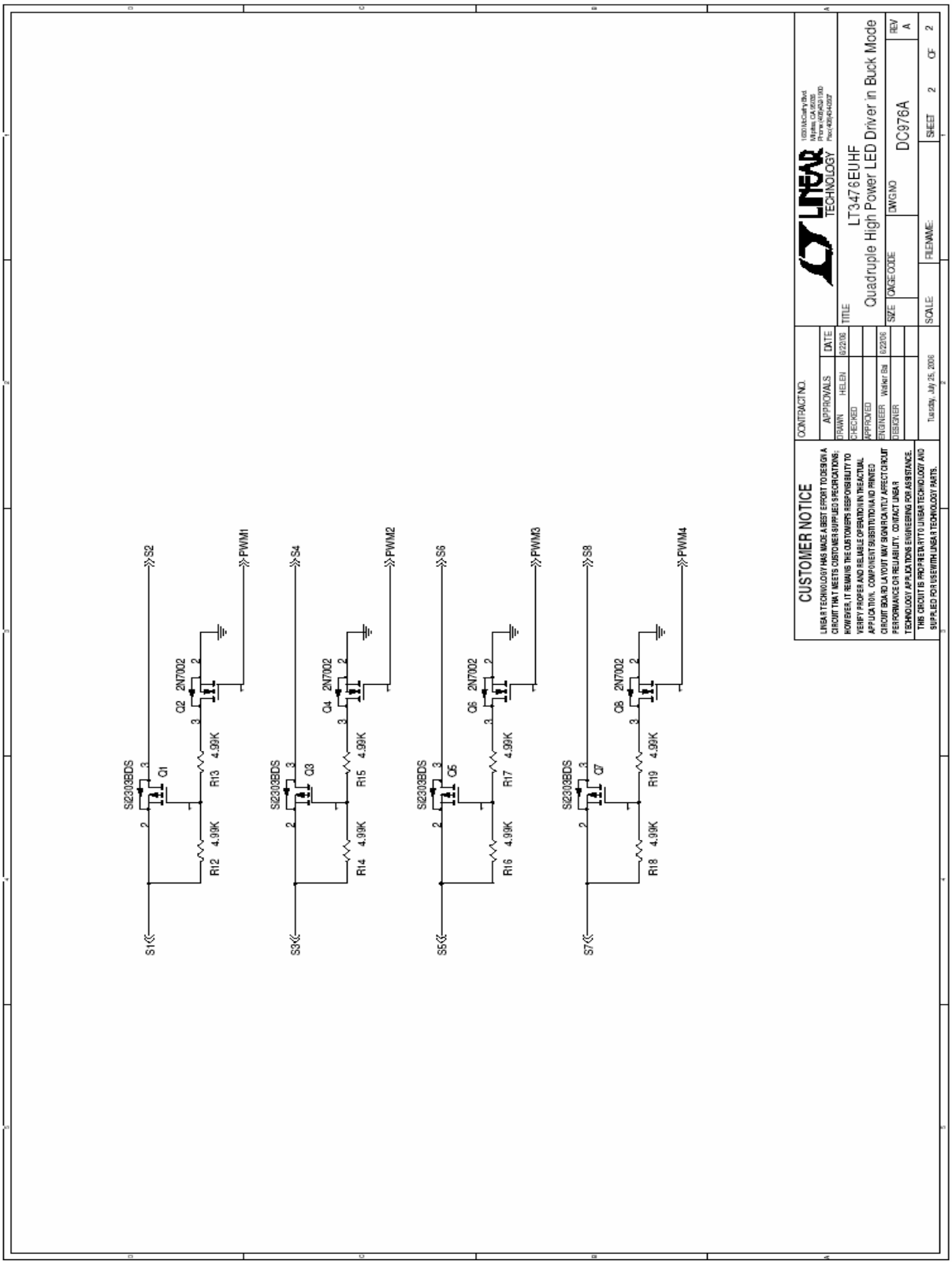


Figure 1. Proper Measurement Equipment Setup


** Remove for faster LED turn-off.
LT3476EUHF
Quadruple High Power LED Driver in Buck Mode
DC976A
LINEAR TECHNOLOGY
CUSTOMER NOTICE


S2
PWM1
Si2303BDS
Q1
Q2 2N7002
R12 4.99K
R13 4.99K
S1
S4
PWM2
Si2303BDS
Q3
Q4 2N7002
R14 4.99K
R15 4.99K
S3
S6
PWM3
Si2303BDS
Q5
Q6 2N7002
R16 4.99K
R17 4.99K
S5
S8
PWM4
Si2303BDS
Q7
Q8 2N7002
R18 4.99K
R19 4.99K
S7
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THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.
CONTRACT NO.
APPROVALS
DRAWN HELEN 6/22/06
CHECKED
APPROVED
ENGINEER Walter Bai 6/22/06
DESIGNER
Tuesday, July 25, 2006
SCALE:
TITLE
LT3476EUHF
Quadruple High Power LED Driver in Buck Mode
SIZE
DWG CODE
DWG NO
DC976A
REV A
FILENAME:
SHEET 2 OF 2

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