

6-String 30mA LED Driver with 1.5% Current Matching

DESCRIPTION

WARNING!

Do not look directly at operating LED.

This circuit produces light that can damage eyes.

Demonstration circuit 1285 is a 6-String 30mA LED Driver with 1.5% Current Matching featuring the LT3598. The LT3598 is a step-up DC/DC converter designed to drive up to 6-strings of LEDs at an output voltage up to 44V. The LED strings are connected to internal current sources where the current level is set with an external resist.

The demonstration circuit drives 20mA through each LED string. Each string can have up to 10 white LEDs. The circuit operation frequency is set to 1MHz. Parameters such as the LED current; the switching frequency, etc can be modified easily based on the demo circuit. When a string is not used, tie its LED pin to V_{OUT} . Any unused string is no longer in the regulation loop. Direct paralleling

multiple strings together to achieve higher per string current is allowed. To paralleling strings, tie the respective LED n pins together. OPENLED indicator flags should any string be left open. To improve efficiency, it is recommended that V_{IN} is between 3.2V and 5.5V. The V_{IN} bias capacitor of the demo circuit is rated at 6.3V. PWM dimming ratio can be as high as 3000:1.

The LT3598 datasheet gives complete descriptions 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 1285.

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

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PERFORMANCE SUMMARY Specifications are at TA = 25°C

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|-----------|--------------------------------|--|------|--------|------|-------|
| V_{IN} | Input Supply Range | | 3.2 | | 5.5* | V |
| PV_{IN} | Power Input Supply Range** | | 3 | | 40 | V |
| I_Q | Quiescent Current | PWM=0V, Not switching | | 3.5 | 5 | mA |
| F_{SW} | Switching Frequency | | 0.9 | 1 | 1.1 | MHz |
| I_{LED} | LED String Current | | 19.5 | 20 | 20.7 | mA |
| I_M | LED String Current Matching*** | | | 0.5 | 1.5 | % |
| Eff | Efficiency | $V_{IN} = 3.3V$; $PV_{IN} = 12V$; $I_{LED} = 20mA$ | | 90 | | % |
| D_{PWM} | PWM dimming ratio | $PV_{IN} = 12V$ | | 3000:1 | | |

*: Limited by the voltage rating of the bias capacitor, C2, on the demo circuit. The IC rating is 30V.

** : MIN PV_{IN} depends on LED string voltages and the Maximum Switch Duty Cycle (specified on page 3 of the datasheet). PV_{IN} greater than MAX LED string voltage is permitted but power dissipation needs to be taken into considerations.

***: Specifications apply over the full operating temperature range.

QUICK START PROCEDURE

Demonstration circuit 1285 is easy to set up to evaluate the performance of the LT3598. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply to VIN and GND.
2. Connect the power input power supply to PVIN and GND.
3. Tie PWM to VIN or a PWM signal.
4. Connect LED strings to LED n_+ and LED n_- . If any string is not used, tie LED n_- to LED n_+ , where n is the string number (between 1 and 6).
5. Turn on power supplies for VIN and PVIN.
NOTE. Make sure that VIN does not exceed 5.5V and PVIN does not exceed 40V.
6. Check for the proper LED voltage and current.

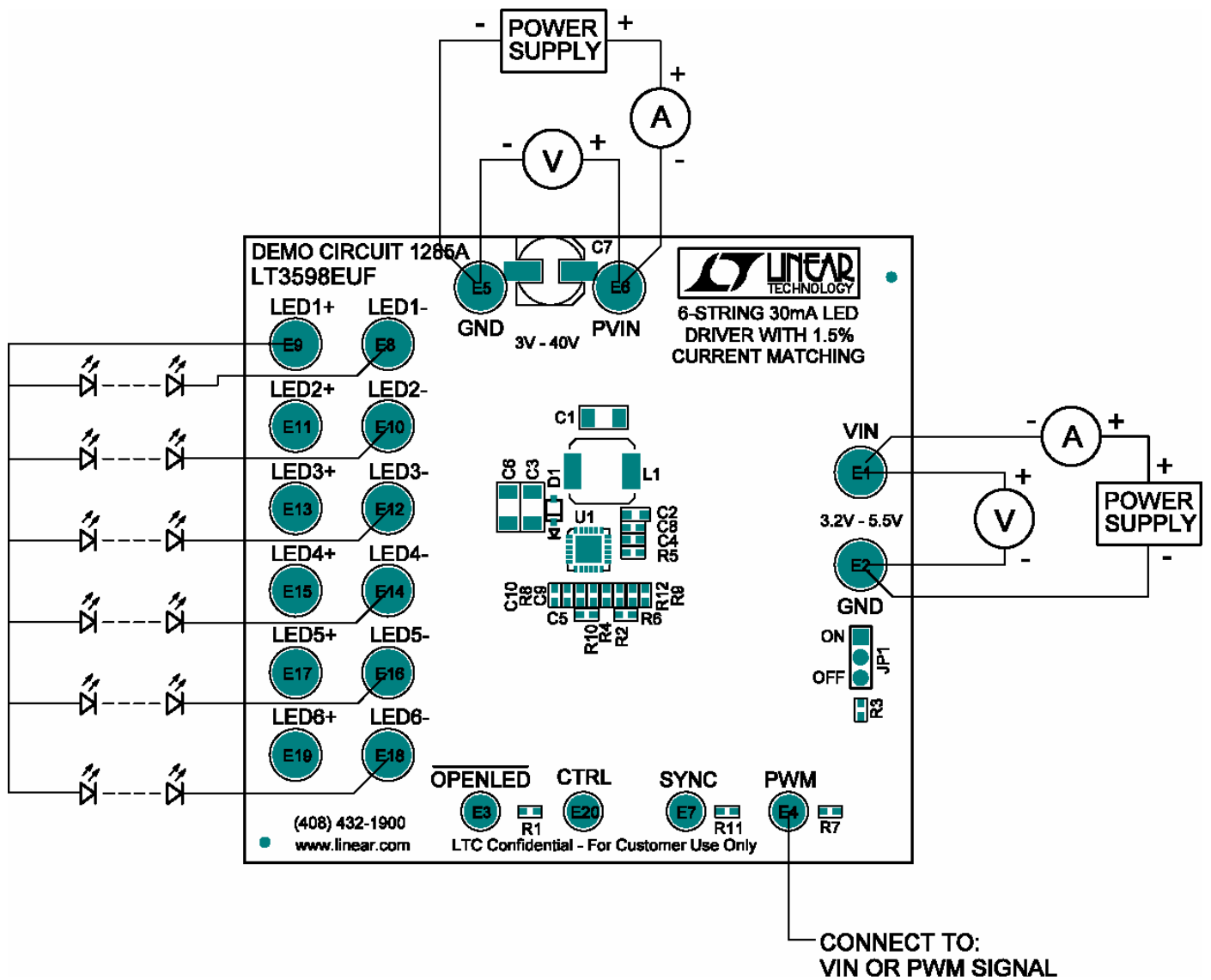


Figure 1. Proper Measurement Equipment Setup

