User's Guide
SNVA079A–July 2004–Revised April 2013

AN-1306 LM3590 Evaluation Board

1 Introduction

The Texas Instruments LM3590 Evaluation Board may be used to test and evaluate a typical LM3590 application circuit. The layout includes extra large pads for the input capacitor (C_{IN}), current set resistor (R_{SET}), and White LEDs (D_1-D_3) to simplify the changing of external components and accommodate different case sizes. Two post holes for leaded pin-sockets (R_{SET}') are also included in the layout to enable the use of leaded resistors. The layout of the board is recommended as a guide for end-use board design.

This Board has been pre-configured to deliver 20mA to 3 White LEDs connected in series. Minimum input voltage for this configuration is 11.3V. LED current is programmed by the R_{SET} resistor, using the equation: $R_{SET} = 100(1.25V/I_{OUT})$. For more detail on the LM3590 features and specifications, see *LM3590 Series White LED Driver* (SNVS258).

2 Evaluation Board Schematic

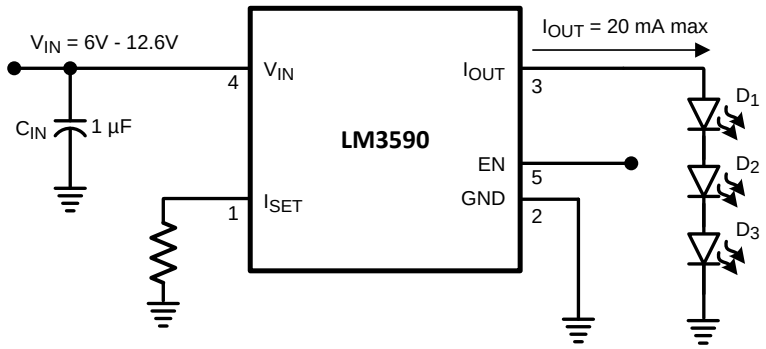


Figure 1. Evaluation Board Schematic

3 Components

3.1 Integrated Circuit

Part #	Package Mark I.D.	Package	Dimensions	Current Option
LM3590	SABB	SOT23-5 (MF05A)	(L × W × H) 3.0mm × 3.0mm × 1.0mm	20mA

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3.2 Capacitors

Capacitor Symbol	Value	Case Size U.S. (Metric)	Height	Temperature Characteristic	Mfr.	Part #
C_{IN}	1.0µF, 10V	0805 (2012)	1.25mm	X7R	TDK	C2012X7R1C105K

3.3 Miscellaneous

LED Symbol	V_F	Case Size U.S. (Metric)	Height	Temperature Range	Mfr.	Part #
D_{1-3}	3.6V	2.1mm × 1.3mm	1.2mm	−40°C to + 100°C	OSRAM	OSRAM LW M67C
R_{SET}	6.19kΩ	1206 (3216)	0.6mm		VISHAY	CRCW12066191F

4 Device Description

The LM3590 is a White LED constant current driver capable of supplying up to 3 White LEDs connected in series with 20mA. This device operates over a wide 6V-12.6V input voltage range. The output can accommodate LEDs with a combined forward voltage of up to 11.5V, from a 12V input supply. LED drive current is programmed by using an external resistor on the I_{SET} pin. Leaded sockets have been placed on the board to aid the changing of resistor values on I_{SET}. The LM3590 is available in a small 5-pin SOT23 package.

LED brightness can be linearly varied up to the programmed LED current by applying a Pulse Width Modulated (PWM) signal to the EN pin of the device. The LED output current of the LM3590 is tightly controlled over temperature and voltage. LED Current matching is assured due to the series configuration of the LEDs. The series topology also simplifies the connection between the White LEDs in the display module and the LM3590 since only one connection is required.

5 Input

Connect the input and ground pins of the evaluation board to a power supply or battery with short, low impedance, low inductance wires or cables. The input voltage range of the LM3590 is 6.0V to 12.6V

6 I_{SET} Pin

An external resistor, R_{SET}, connected to the I_{SET} pin sets the output current. The current matching through each LED is guaranteed by the series LED drive topology. Use following equation to approximate and program the LED current:

$$I_{OUT} = 100 \times (1.25V \div R_{SET}) \text{ (Amps)} \quad (1)$$

7 Enable Mode

A jumper is present on the evaluation board to bring the LM3590 in and out of shutdown. The LM3590 has an active-high enable pin (LOW = shut down, HIGH = operating). The LM3590 EN pin can be driven with a low-voltage CMOS logic signal (1.5V logic, 1.8V logic, and so on). There is an internal 500kΩ pull-down between the EN and GND pins of the LM3590.

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8 Board Layers

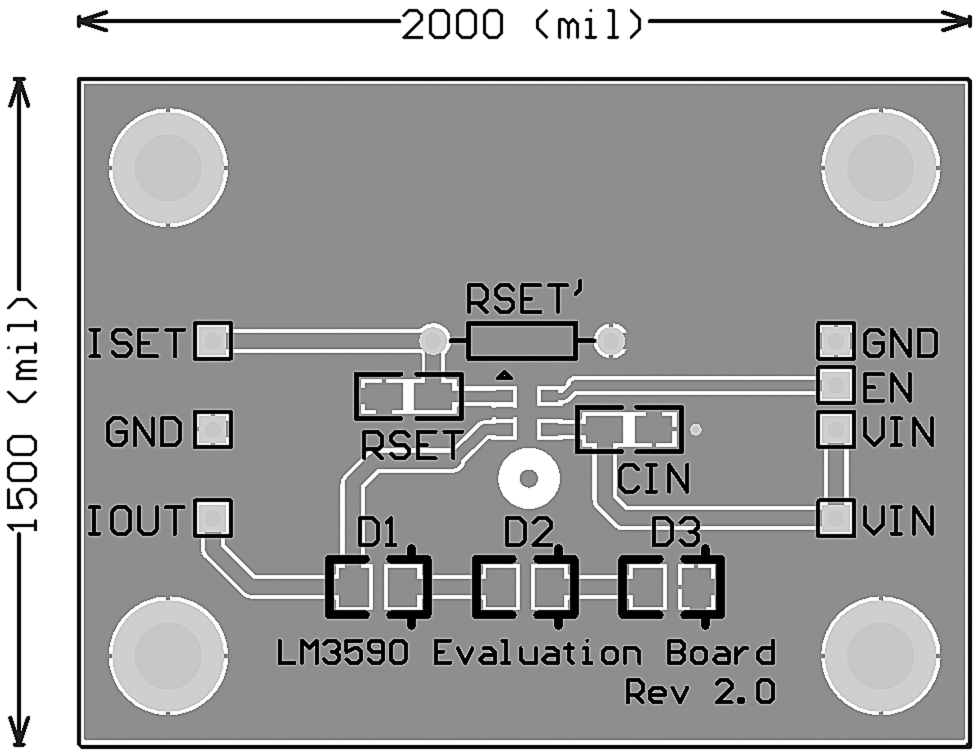


Figure 2. Top Layer, Top View

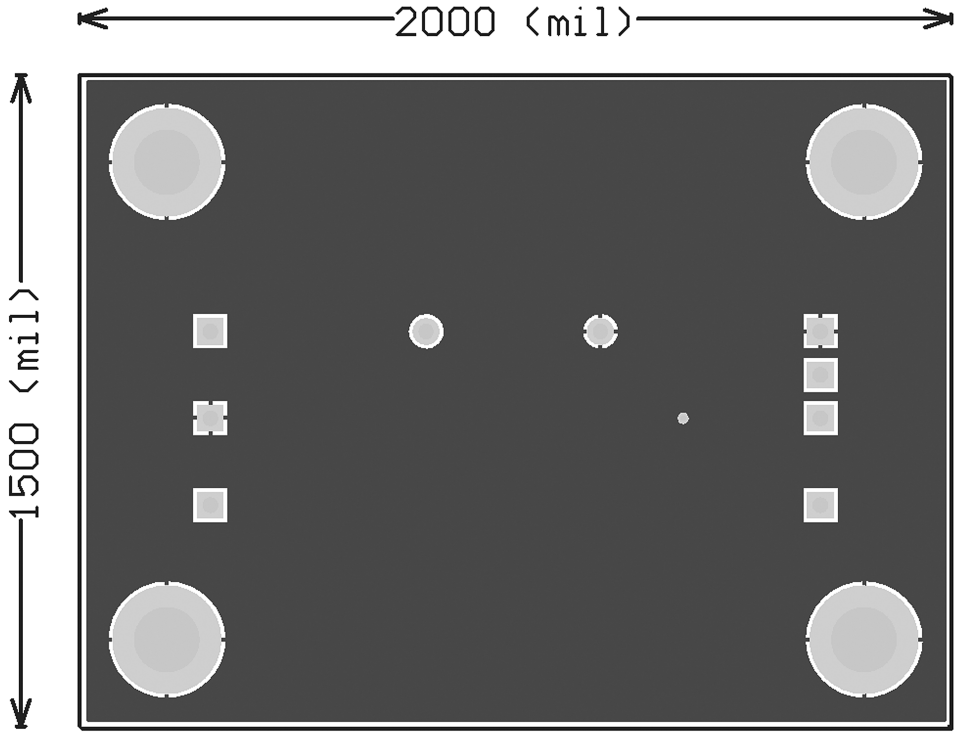


Figure 3. Bottom Layer, Top View (unmirrored)

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