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

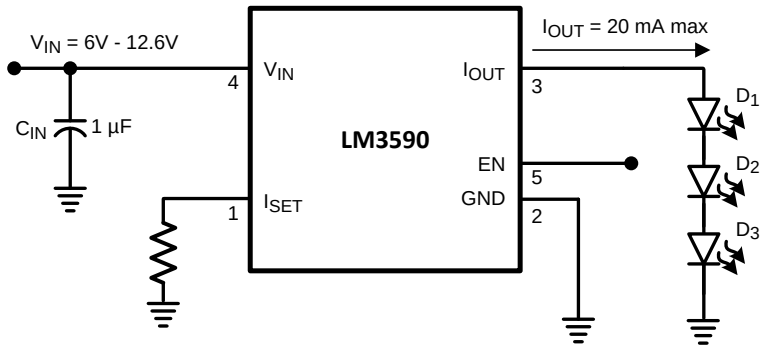

Figure 1. Evaluation Board Schematic

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

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.

8 Board Layers

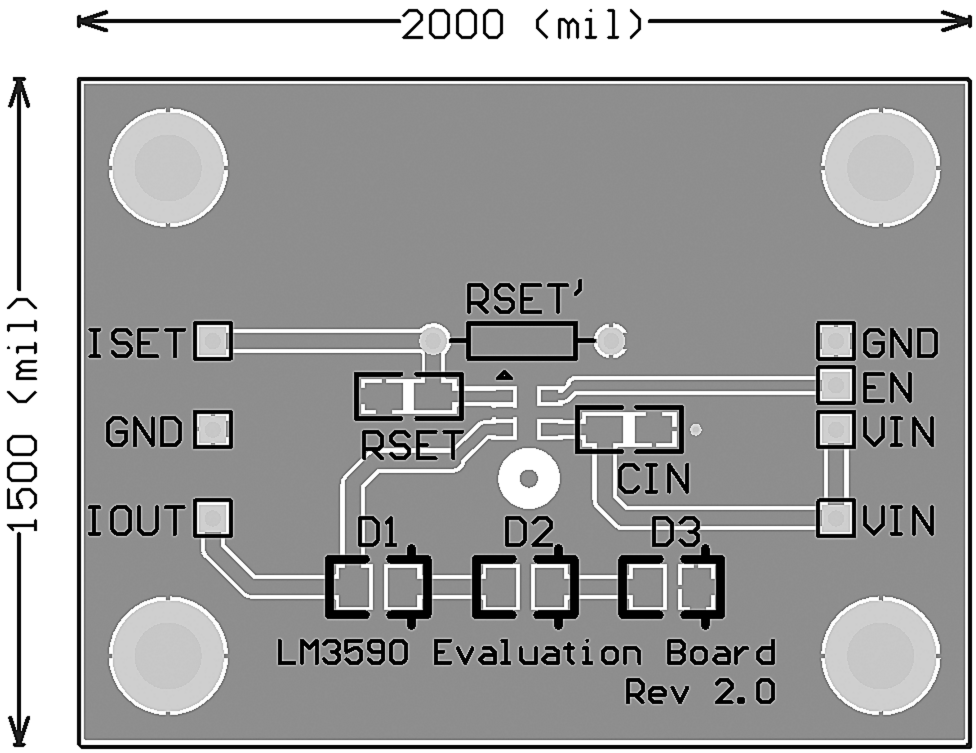

Figure 2. Top Layer, Top View

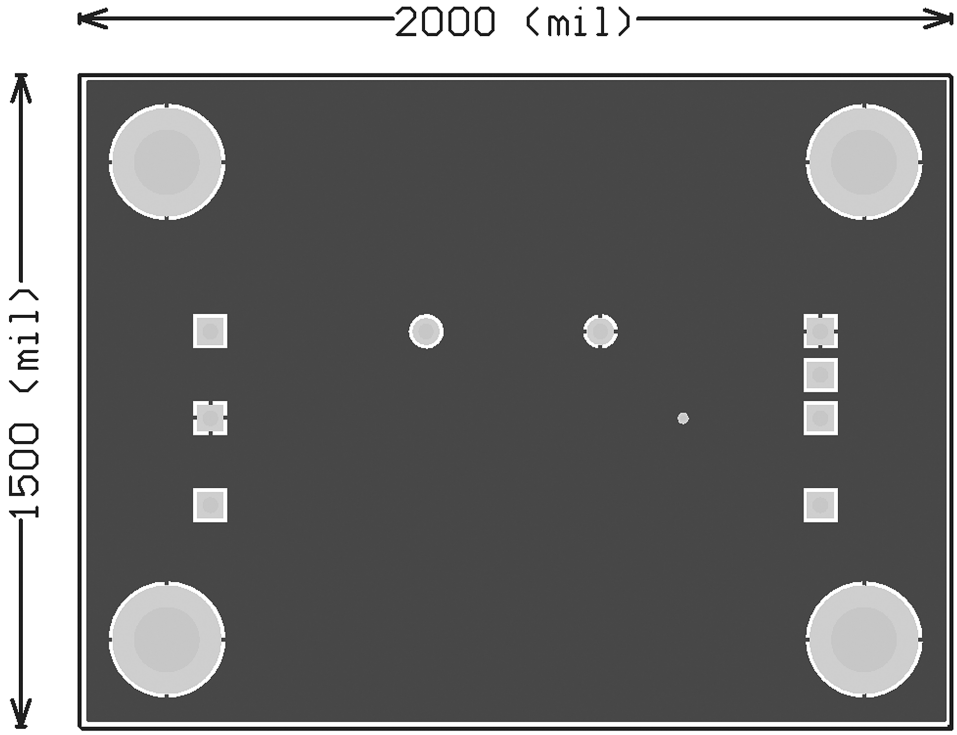

Figure 3. Bottom Layer, Top View (unmirrored)

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265