LM2754 Evaluation Board
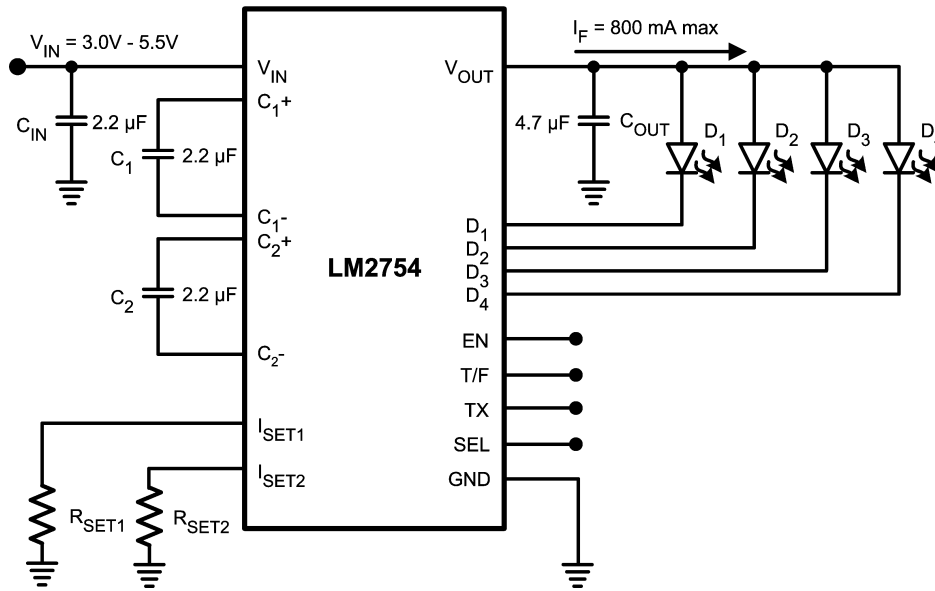
National Semiconductor
Application Note 1546
November 2006

Schematic

20216001

Bill of Materials

Component Symbol	Value	Package [U.S. (Metric)]	Dimensions (mm)	Temperature Characteristic	Manufacturer	Part #
LM2754	--	LLP-24 Non-pullback	4.0 x 4.0 x 0.8	--	National	LM2754SQX
C_{IN}	2.2µF, 16V	0603 (1608)	1.6 x 0.8 x 0.8	X5R	TDK	C1608X5R1C225K
C_{OUT}	4.7µF, 10V	0603 (1608)	1.6 x 0.8 x 0.8	X5R	TDK	C1608X5R1A475K
C_1, C_2	2.2µF, 16V	0603 (1608)	1.6 x 0.8 x 0.8	X5R	TDK	C1608X5R1C225K
D_X	Flash LED(s)	--	2.0 x 1.6 x 1	--	Lumiled	PWF1
Rset1	20kΩ	0603 (1608)	1.6 x 0.8 x 0.6	--	Vishay-Dale	CRCW06032002F
Rset2	5KΩ	0603 (1608)	1.6 x 0.8 x 0.6	--	Vishay-Dale	CRCW06034991F

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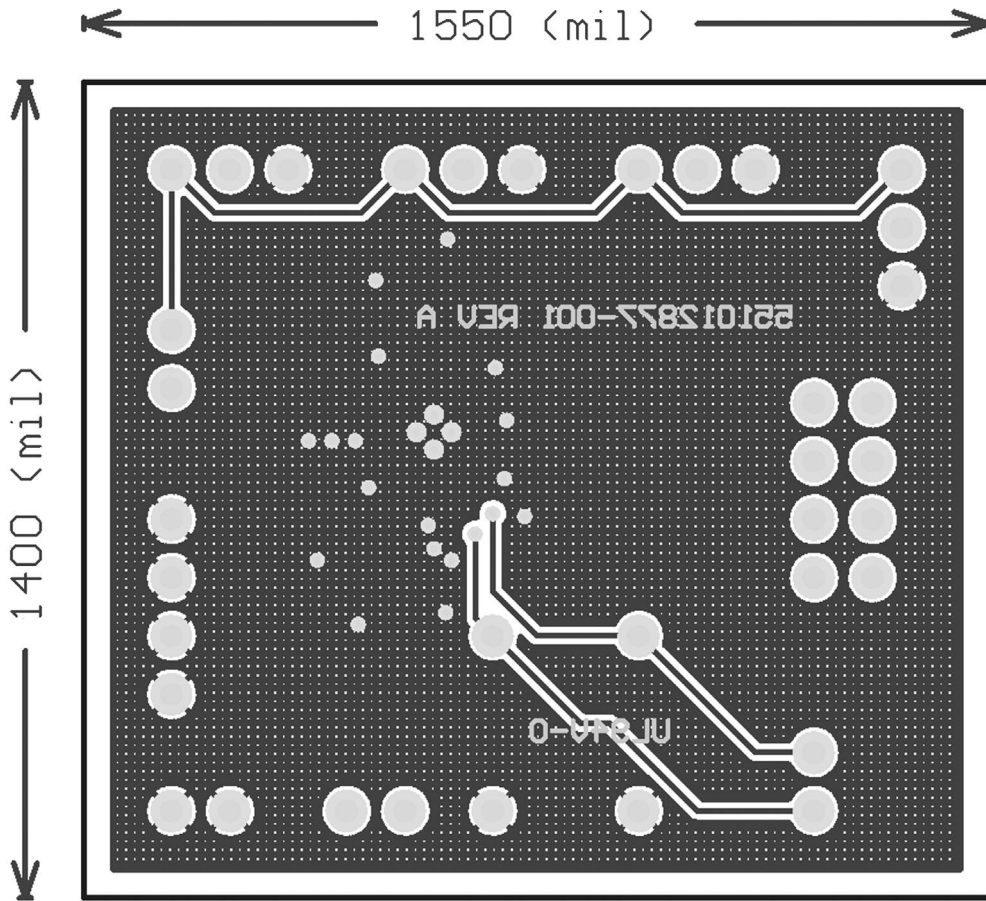# LM2754 Evaluation Board Layout
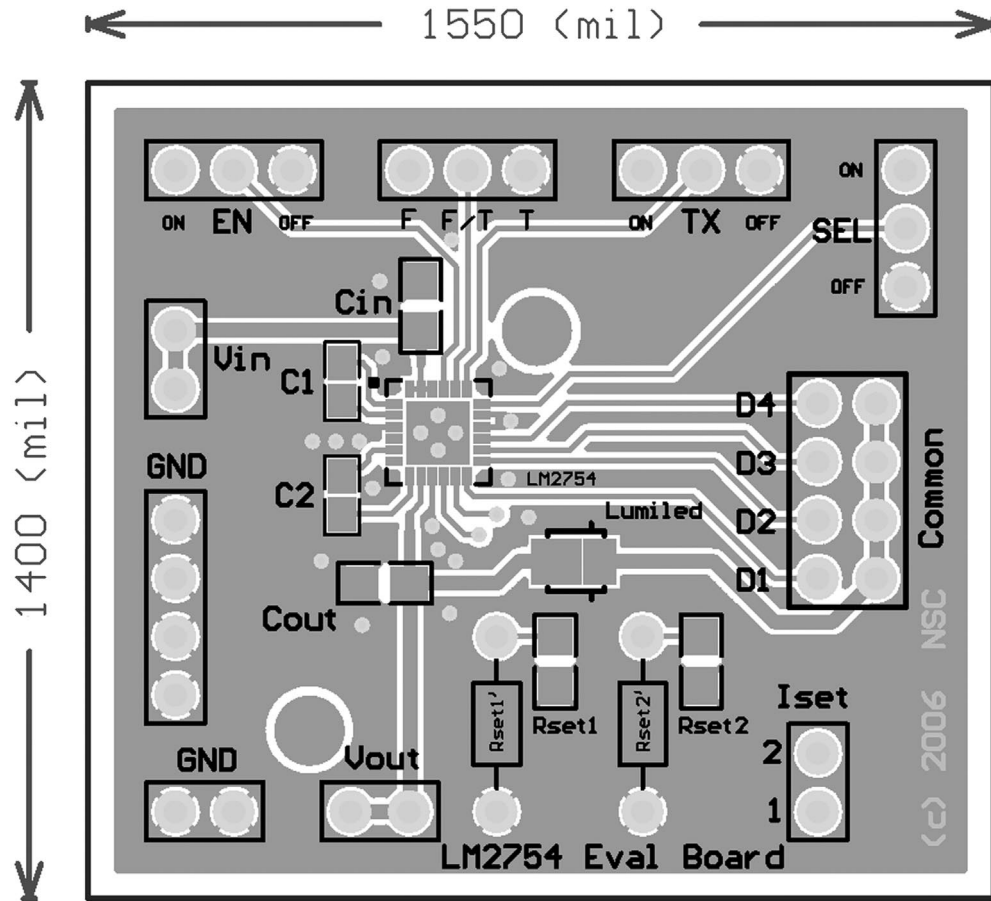
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FIGURE 1. Top Layer

LM2754 Evaluation Board Layout (Continued)

FIGURE 2. Bottom Layer (top view, unmirrored)

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Board Operation

BASIC CONNECTIONS

To operate the LM2754 evaluation board, connect a supply voltage (2.7V-5.5V) between board connectors Vin and GND.

Jumper Connections:

- EN: Connecting the jumper between the "ON" post and the center post of the "EN" header strip enables the part, and connecting the center post to the "OFF" post disables the part (Shutdown). The "EN" jumper block serves as the master enable for the device. Enabling the device is also referred to as Torch mode, where the LEDs are driven at a constant, nominal current level.

- F/T: Connecting the jumper between the "F" post and the center post of the "F/T" header strip enables Flash Mode (High Current Mode) , and connecting the center post to the "T" post disables Flash Mode. The default mode for "F/T" is "T" (Torch Mode).

- TX: Connecting the jumper between the "ON" post and the center post of the "TX" header strip enables TX Mode (RF PA Transmission Flash Interrupt), and connecting the center post to the "OFF" post disables TX Mode. The default mode for "TX" is "OFF". In a typical application, the signal to the "TX" pin is a pulsed signal from the RF Power Amplifier when the RF PA is active.

- SEL: Connecting the jumper between the "ON" post and the center post of the "SEL" header strip enables SEL Mode (Selective D_4 disable), and connecting the center post to the "OFF" post disables SEL Mode. The default mode for "SEL" is "OFF", with all current sinks "D1-4" enabled.

R_{SETX}: SETTING LED CURRENTS

The resistance of the Rsetx resistor sets the DC output currents of the LM2754, approximated by the following equation:

$$I_{Dx} = 800 \times (1.25V / Rsetx)$$

The default Rset1 on the evaluation board is 20kΩ for Torch Mode, which sets a DC output current of 50mA (typ.) per current sink, or 200mA total continuous current. The default Rset2 on the evaluation board is 5kΩ for Flash Mode, which sets a DC output current of 200mA (typ.) per current sink, or 800mA total pulsed current.

Components Rset1' and Rset2' are optional leaded resistor replacements for the surface mount Rset1 and Rset2, provided for ease of use.

HEADERS: LED ACTIVATION AND PWM BRIGHTNESS CONTROL

All four jumpers on the "Common" header block must be in place for D1-4 current sinks to power the Flash LED. Removing any one of the "Common" jumpers disconnects the corresponding current sink from the LED and causes the LM2754 to default to a gain of 2x. However if a logic High voltage is placed on the "SEL" pin, removing the jumper for D4 does not affect device operation. The default connection for each jumper on the "Common" header block are from the side labeled with "D1-4" to the side labeled "Common". To connect a Flash LED to the LM2754, other than the one supplied on the evaluation board, remove all jumpers on the "Common" header block and connect each "D1-4" pin to the cathode(s) and the "Vout" pin to the anode(s) of the desired Flash LED.

Connecting the center post on the "EN" header strip to the "ON" post automatically turns on the LED(s) into Torch Mode. Upon enabling the device, the modes selected by the "F/T", "TX" and "SEL" jumper blocks will also apply. For example, the "EN" pin and "F/T" pin can be connected together to a logic High voltage to enable the LM2754 directly into Flash Mode from a shutdown state. The "TX" Mode Pin is for a pulsed signal from the RF Power Amplifier to momentarily reduce the Flash current to the Torch current level, lowering the load on the battery line during RF PA pulses. "SEL" Mode is designed to accommodate Flash LED modules with only 3 LED die, while still utilizing the adaptive gain transition topology of the LM2754. The "SEL" function turns off the "D4" current sink. This feature can also be used to instantly reduce the total Torch or Flash current levels by 25%, if all four currents sink are used in the application.

A pulse-width modulated (PWM) signal can be connected to the F/T pin (in the F/T header block) to adjust the average brightness level for Flash Mode, up to the maximum programmed current. The duty cycle of the PWM signal determines the net brightness, as perceived by the human eye. For example, with a duty cycle of 50%, the LEDs will only be ON for 50% of the time, and the perceived brightness will be approximately half of what the brightness is when the LEDs are driven at full current for the entire flash pulse. Recommended frequency range for PWM signals: 100Hz to 1000Hz.

Using a PWM signal to control Torch Mode current is not recommended due to the control loop delay that occurs when the device is enabled.

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Notes

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