

LM3519 Evaluation Board

National Semiconductor
Application Note 1406
Vera Tsang
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General Description

The LM3519 evaluation board is a working demonstration of a step up DC-DC converter. The LM3519 drives up to 4 white LEDs with constant current to provide LCD backlighting in handheld devices. The LED current is internally set to 20mA eliminating the use of external resistor. The series connection allows the LED current to be identical for uniform brightness and minimizes the number of traces to the LEDs. Brightness control is achieved by applying a PWM signal on En pin with frequencies up to 30kHz. A proprietary PFM architecture implementation results in non pulse skipping variable frequency operation over input voltage range permitting the use of low-cost, small external components. For further information and electrical characteristics, please refer to the LM3519 datasheet.

Operating Conditions

- Junction temperature (T_J) range: -40C to +125C
- Ambient temperature (T_A) range: -40C to +85C
- Input Voltage Range: 2.7V to 5.5V
- $I_{OUT} = 20\text{mA}$

Package

- SOT 23 - 6 pin

Typical Application

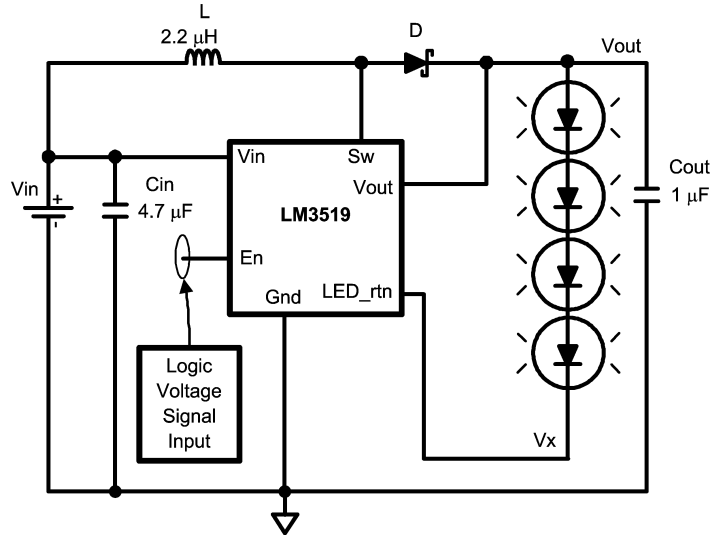
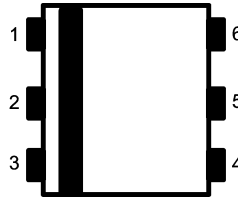


FIGURE 1. Typical Application Circuit

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Connection Diagram and Package Information



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FIGURE 2. SOT23-6, Top View

Ordering Information

Current	Order Number	Package Marking	Supplied As
20mA	LM3519MK-20	D52B	1000 Units, Tape-and-Reel
	LM3519MKX-20	D52B	3000 Units, Tape-and-Reel

Pin Descriptions (SOT23-6)

Pin#	Name	Description
1	En	Device Enable Connection
2	Gnd	Ground Connection
3	Vout	Output Voltage Connection
4	LED_rtn	White LED Current Sensing Input Connection
5	Sw	Drain Connection of the Internal Power Field Effect Transistor (FET) Switch
6	Vin	Input or Supply Voltage Connection

PWM Dimming

If a PWM signal is used to adjust the brightness, a control signal frequency between 17k Hz to 30kHz is recommended. Although the LM3519 is capable of operating outside this frequency range, it is not recommended to operate below 17kHz for the following reasons: 1) frequency below 100Hz is likely to cause visible flicker in the light emitted by the LED string, 2) frequency below 17kHz may induce audible noise due to combinations of some capacitance and PCB. A PWM frequency above 30kHz is possible but the current linearity vs duty cycle will be affected.

If it is not possible to operate the dimming control above 17kHz, audible noise emission may be minimized by using capacitors with low susceptibility to piezoelectric induced stresses, such as poly film designs. Minimum audible noise is most likely to occur when the PWM frequency is less than 2kHz. It is recommended that any application using a PWM

control signal below 17kHz be thoroughly evaluated for undesirable audible noise.

Layout Guidelines

The input capacitor, C_{IN} , must be placed close to the LM3519. Placing C_{IN} close to the device will reduce the metal trace resistance effect on input voltage ripple. Metal trace connections for the C_{OUT} capacitor can increase the effective series resistance, which affects output voltage ripple and efficiency. Trace connections to the inductor should be short and wide to reduce power dissipation, increase overall efficiency and reduce EMI radiation. The diode, like the inductor, should have trace connections that are short and wide to reduce power dissipation and increase overall efficiency. For more details regarding layout guidelines for switching regulators, refer to Applications Note AN-1149.

Evaluation Board Layout (Continued)**BOM For Common Configurations**

Component Name	Value	Specification	Manufacturer
U1	LM3519	TSOT-5	NSC
Cin	4.7uF, 6.3V, 0603	AVX06033D475MAT	AVX
Cout	1uF, 25V, 0603	AVX06033D105MAT	AVX
D1	Schottky Diode	CMMSH1-40	Central Semiconductor
L1	2.2uH	LPO3310-222ML	CoilCraft
LED1-4	LWT67C	Hyper Topled	Osram Opto Semiconductors

Test Pin	Description	Size	Quantity
Vin	Turret	0.09in	1
GND	Turret	0.09in	1
EN	Turret	0.09in	1
SW	Turret	0.09in	1
Vout	Turret	0.09in	1

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National Semiconductor
Americas Customer
Support Center
Email: new.feedback@nsc.com
Tel: 1-800-272-9959

National Semiconductor
Europe Customer Support Center
Fax: +49 (0) 180-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 69 9508 6208
English Tel: +44 (0) 870 24 0 2171
Français Tel: +33 (0) 1 41 91 8790

National Semiconductor
Asia Pacific Customer
Support Center
Email: ap.support@nsc.com

National Semiconductor
Japan Customer Support Center
Fax: 81-3-5639-7507
Email: jpn.feedback@nsc.com
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