

## General Description

The MP1517 is a 4A, fixed frequency step-up converter ideal for camera flash circuits driving up to 4 white LEDs. The high 1.2MHz switching frequency allows for smaller external components producing a compact solution for size constrained cameras, PDAs and cell phones as well as medium-to-high current step-up, flyback, and SEPIC applications.

The MP1517 regulates the output voltage up to 25V with efficiencies as high as 93%. Soft-start, cycle-by-cycle current limiting, and input undervoltage lockout prevent overstressing or damage to sensitive external circuitry at startup and output short-circuit conditions. Fixed frequency operation eases control of noise, making the MP1517 optimal for noise sensitive applications such as mobile handsets. Current-mode regulation and external compensation components allow the MP1517 control loop to be optimized over wide variety of input voltage, output voltage and load current conditions.

The MP1517 is offered in a tiny 4mm x 4mm 16 lead QFN.

## Features

- 4A Peak Current Limit
- Low 700mV Feedback Threshold
- Internal 150mΩ Power Switch
- $V_{IN}$  range of 2.6V to 25V
- >93% Efficiency
- Zero Current Shutdown Mode
- Under Voltage Lockout Protection
- Open Load Protection
- Soft Start Operation
- Thermal Shutdown
- Tiny 4mm x 4mm 16 pin QFN Package

## Applications

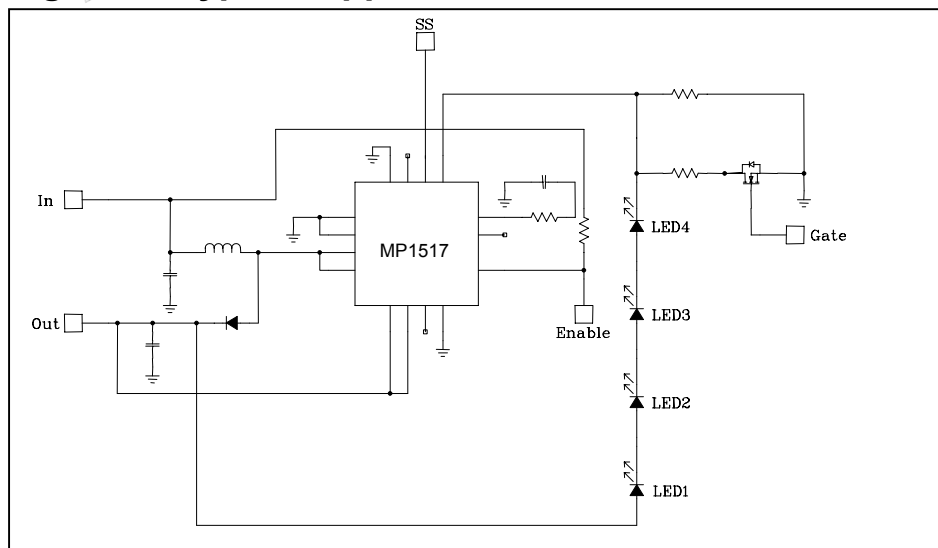
- White Flash Circuits found on:
  - Handheld Computers, PDAs
  - Cell phones
  - Digital Still and Video Cameras

## Ordering Information

Part Number	Package	Temperature
MP1517DR	QFN16 (4x4)	-40° to +85°C

\* For Tape & Reel use suffix - Z (e.g. MP1517DR-Z)

**Figure 1: Typical Application Circuit**



**Absolute Maximum Ratings**

Input Supply Voltage $V_{IN}$	-0.3V to 28V
SW Pin Voltage $V_{SW}$	-0.3V to 28V
Voltage at All Other Pins except OLS	-0.3V to 6V
Storage Temperature	-55°C to +150°C

**Recommended Operating Conditions**

IN Input Supply Voltage $V_{IN}$	2.6V to 25V
Operating Temperature	-40°C to +85°C

**Package Thermal Characteristics**

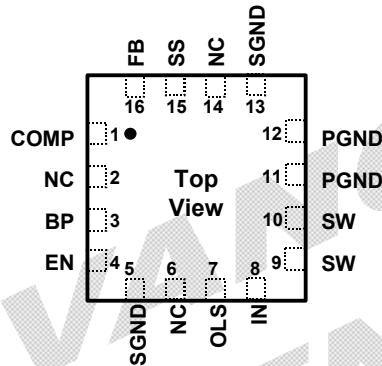
Thermal Resistance $\Theta_{JA}$	100°C/W
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**Electrical Characteristics** ( $V_{IN} = 5.0V$ ,  $T_A = 25^\circ C$  Unless specified otherwise)

Parameters	Conditions	Min	Typ	Max	Units
IN Input Voltage Range		2.6		25	V
IN Shutdown Supply Current	$V_{EN} < 0.3V$		0.5	5	$\mu A$
IN Operating Supply Current	$V_{EN} > 2V$ , $V_{FB} = 0.8V$		900		$\mu A$
BP Output Voltage	$V_{IN} = 2.6V$ to 25V		2.4		V
IN Undervoltage Lockout Threshold	$V_{IN}$ Rising	2.15		2.35	V
IN Undervoltage Lockout Hysteresis			100		mV
Output Voltage Range		3.3		25	V
EN Input Low Voltage				0.3	V
EN Input High Voltage		2			V
EN Input Hysteresis			100		mV
EN Input Bias Current				100	nA
SW Switching Frequency		1.08	1.2	1.32	MHz
SW Maximum Duty Cycle	$V_{FB} = 0.6V$	85	90		%
Error Amplifier Voltage Gain			400		V/V
Error Amplifier Transconductance			400		$\mu S$
COMP Maximum Output Current	Sourcing and Sinking		40		$\mu A$
FB Regulation Threshold		679	700	721	mV
FB Input Bias Current	$FB = 0.7V$		-100		nA
SS Charging Current	During Soft-Start		2		$\mu A$
SW On Resistance	$V_{IN} = 5V$		150		$m\Omega$
	$V_{IN} = 3V$		225		$m\Omega$
SW Current Limit	Note 1		4.0		A
SW Leakage Current	$V_{SW} = 25V$		0.5		$\mu A$
Thermal Shutdown			160		$^\circ C$
Open Load Shutdown Threshold	Measured at OLS pin		28		V

Note 1: Guaranteed by design. Not tested.

## Pin Descriptions



**Table 1: Pin Description**

QFN Pin	Name	Function
1	COMP	Compensation: Error Amplifier output. Connect to a series RC network to compensate the regulator control loop.
2, 6, 14	NC	No Connect
3	BP	Output of the internal 2.4V low dropout regulator. Connect a 10nF bypass capacitor between BP and SGND. Do not apply an external load to BP.
4	EN	Regulator On/Off Control Input. A logic high input ( $V_{EN} > 2V$ ) turns on the regulator, a logic low puts it into low current shutdown mode.
5, 13	SGND	Signal Ground
7	OLS	Open Load Shutdown pin senses regulator output voltage to protect IC during open load operation. When this pin's voltage exceeds 28V, the output switch is shut off. The device then restarts in soft start mode ( <i>see Soft Start Input</i> ).
8	IN	Input Supply Pin. This pin can be connected to the regulator's input supply or to the output for boot-strapped operation.
9, 10	SW	Output Switching Node. SW is the drain of the internal n-channel MOSFET. Connect the inductor and rectifier to SW to complete the step-up converter.
11, 12	PGND	Power Ground
15	SS	Soft-Start Input. Connect a 10nF to 22nF capacitor from SS to SGND to set the soft-start. SS sources 2 $\mu$ A to an external soft-start capacitor during start-up. As the voltage at SS increases to 1.2V, the voltage at COMP is clamped to 0.7V above the voltage at SS limiting the startup current. The external capacitor at SS is discharged to ground when under voltage lockout, thermal shutdown occurs or open load shutdown occurs.
16	FB	Regulation Feedback Input. The MP1517 regulates the voltage across the current sense resistor between FB and GND. Connect a current sense resistor from the bottom of the LED string to GND. Connect the bottom of the LED string to FB. The regulation threshold is 0.7V.

Figure 2: Flash Circuit driving 4 white LEDs (150mA peak LED current)

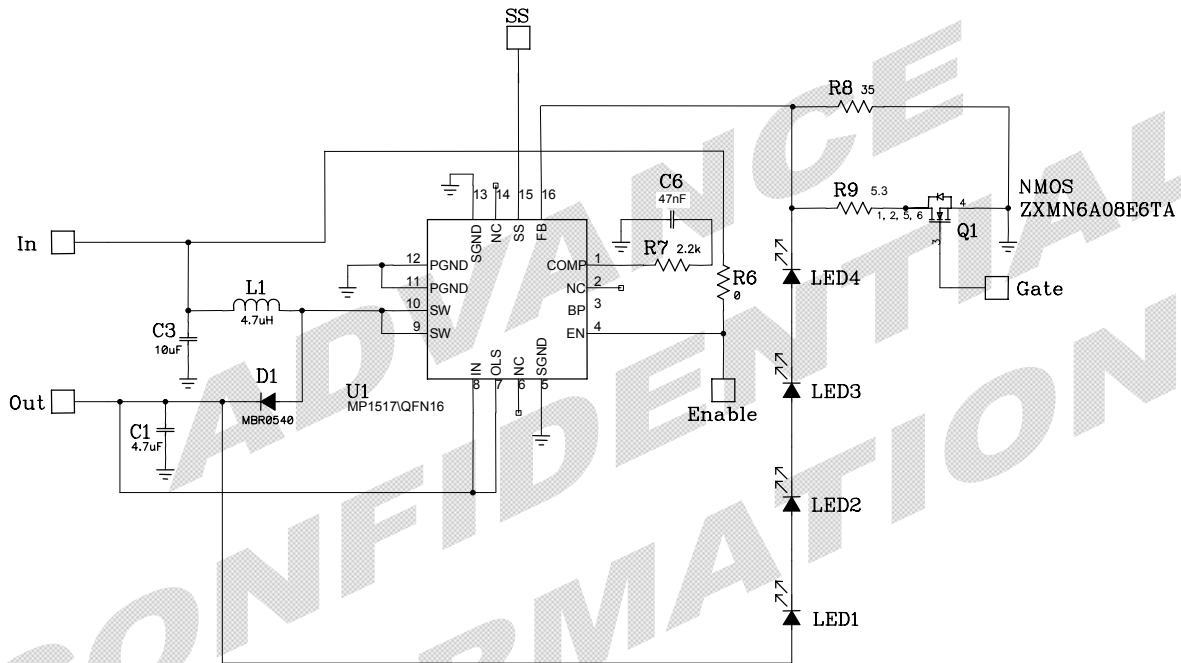
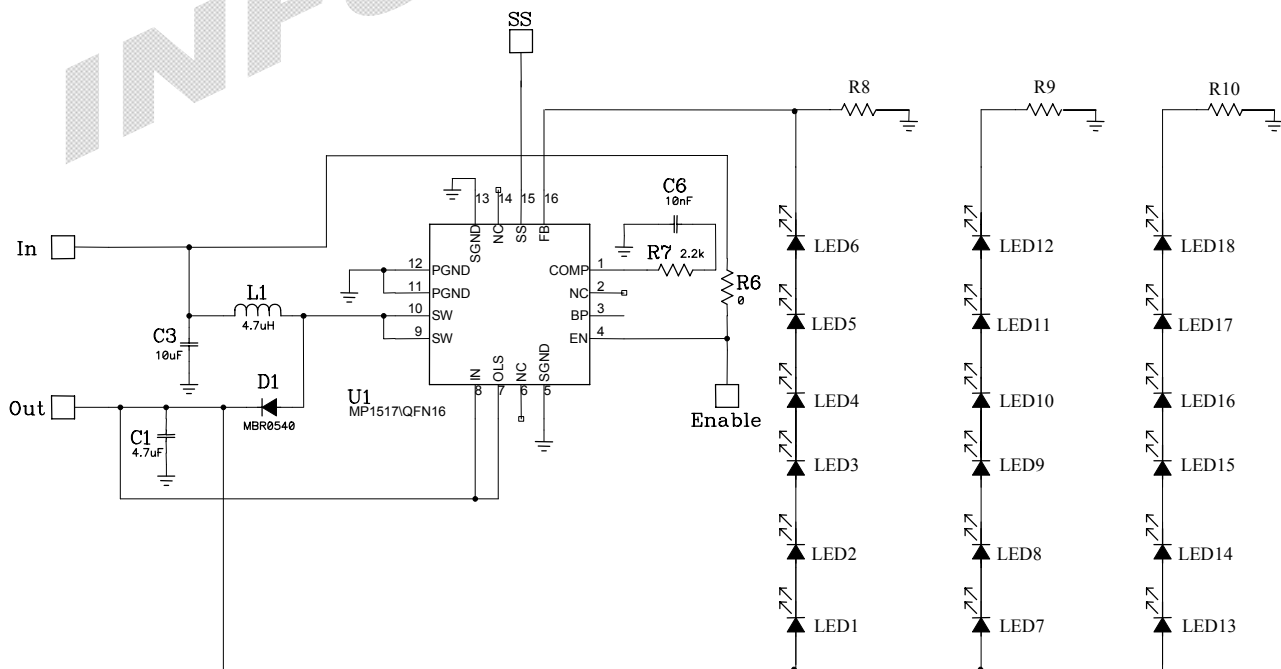


Figure 3: Driving 3 strings of 6 white LEDs





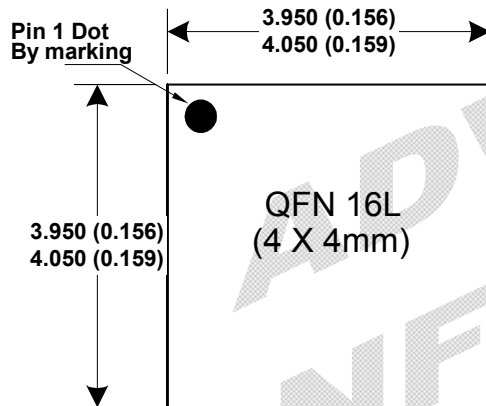
Monolithic Power Systems

# MP1517 3A White LED Camera Flash Driver

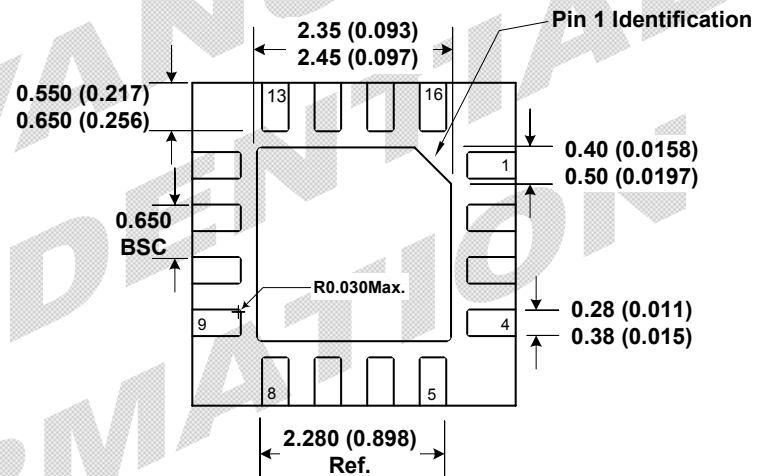
PRELIMINARY

## Packaging

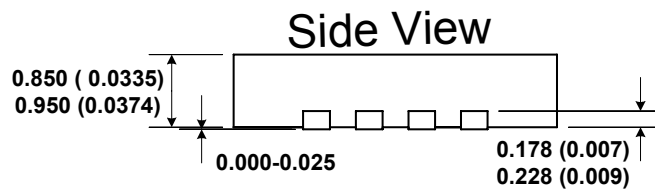
QFN16 (4x4)



Top View



Btm View



Side View

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