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ZXSC400 Driving 3W high power LEDs

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Description

This design note shows the ZXSC400 driving a single 3W LED. The input voltage ranges from 1.8V to 3.6V with constant output current of 700mA down to 2.6V with an overall 80% of efficiency.

Figure 1 shows typical constant current solution with ZXSC400 driving one 3W LED. The input voltage range allows the use of two alkaline batteries or one Lithium Ion cell (CR123A) for portable flashlight applications.

Q1 and Q2 forms a pseudo Darlington pair which provide enough current gain for a switching current up to 1.5A. In order to provide better switch off performance, a Schottky diode, D2, is used to drain the base current from the base of Q1 directly. In order to achieve higher efficiency, current monitor U2 is used to provide a low voltage drop LED current sensing through the low ohmic resistor, R2. The LED current is converted to 300mV feedback voltage through R3.

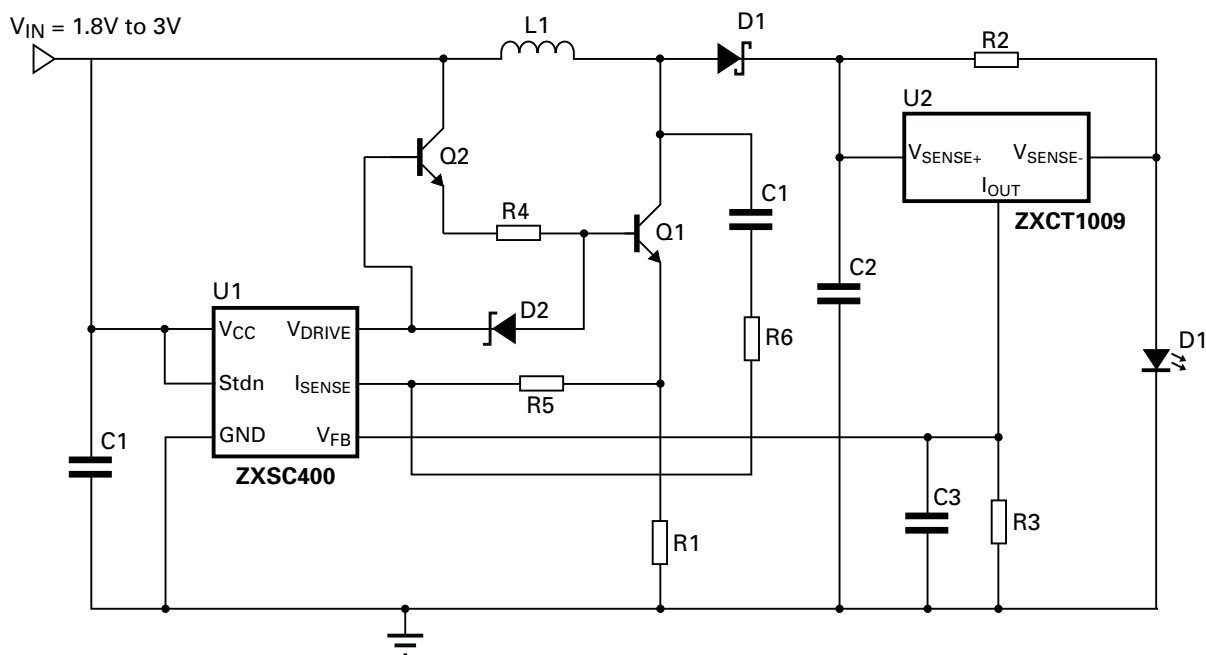


Figure 1 Schematic diagram

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Ref.	Value	Part number	Manufacturer	Comments
U1		ZXSC400E6	Zetex	LED driver in SOT23-6
U2		ZXCT1009	Zetex	Current monitor in SOT23
Q1		ZXTN25012EFH	Zetex	Low sat NPN in SOT23
Q2		ZXTN25012EFL	Zetex	Low sat NPN in SOT23
D1		ZHCS2000	Zetex	2A Schottky in SOT23
D2		ZHCS400	Zetex	400mA Schottky
L1	15 μ H	744 561 15	Würth Elektronik	ISAT = 3A DCR=60m Ω
R1	20m Ω 1%	Generic	Generic	0805 size low ohmic
R2	50m Ω 1%	Generic	Generic	0805 size low ohmic
R3	820 Ω 1%	Generic	Generic	0805 size
R4	82 Ω 5%	Generic	Generic	0805 size
R5	4.7 Ω 5%	Generic	Generic	0805 size
R6	10 Ω 5%	Generic	Generic	0805 size
C1	22 μ F 10V 10%	Generic	Generic	1206 size X7R/X5R
C2	4.7 μ F 10V 10%	Generic	Generic	1206 size X7R/X5R
C3	0.22 μ F 16V			
10%	Generic	Generic		
C4	330pF/10V	Generic	Generic	0805 size

Table 1 Bill of materials

Typical operating characteristics

(For typical application circuit where $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

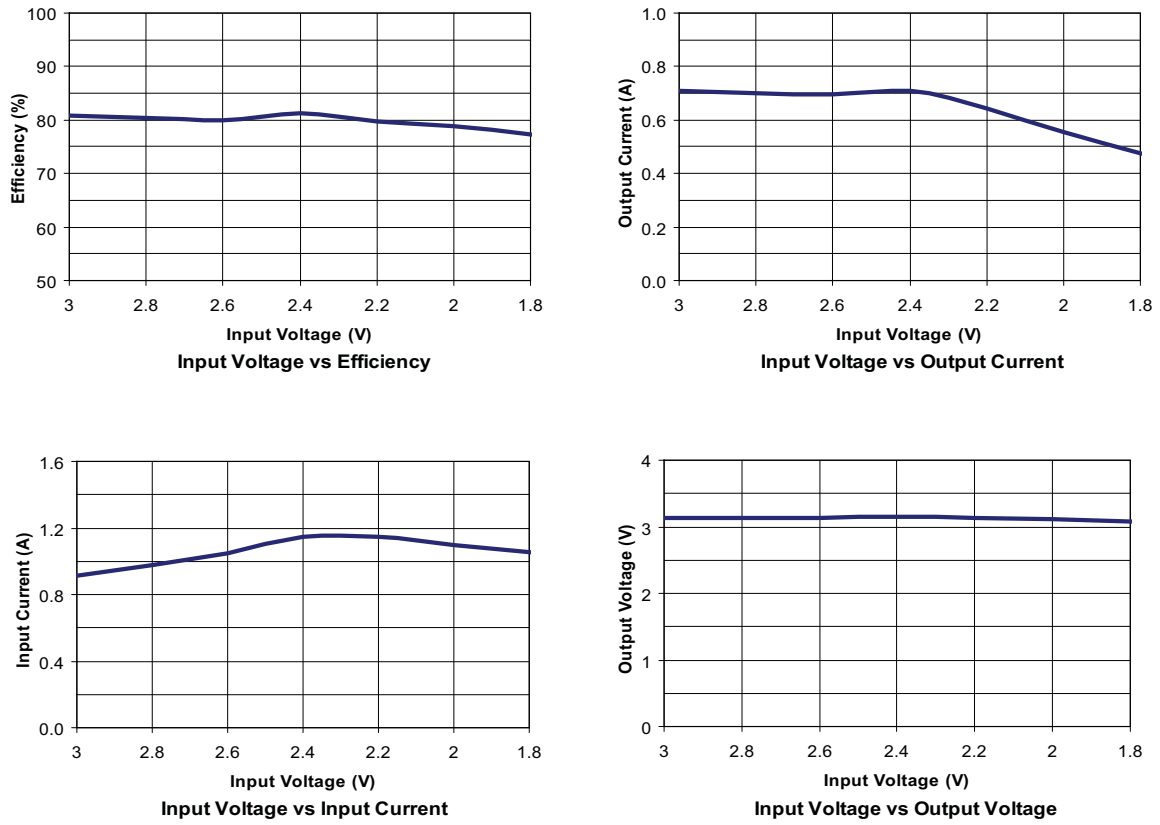


Figure 2 Performance graphs

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